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**OAK RIDGE
NATIONAL
LABORATORY**

MARTIN MARIETTA

**Oak Ridge National Laboratory
Energy Efficiency and Renewable
Energy Program**

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1994 Edition

K. H. Vaughan

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BIBLIOGRAPHY

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PREFACE

The *Bibliography* contains listings of publicly available technical reports, journal articles, and conference papers resulting from Oak Ridge National Laboratory research and development projects sponsored by the Department of Energy, Office of Energy Efficiency and Renewable Energy, and published between 1989 and mid-1994. Over 200 citations have been added since the last edition.

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Oak Ridge TN 37831-6188
Fax: 615/576-7572
Voice: 615/241-4292

ANALYSIS AND EVALUATION

- 1 *Effects of Resource Acquisitions on Electric-Utility Shareholders***
ORNL/CON-387 (May 1994)
E. Hirst. S. Hadley. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 2 *IRP and the Utility of the Future***
IRP Quarterly 9, pp. 26-30 (April 1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 3 *Financial Comparison of Time-of-Use Pricing With Technical DSM Programs and Generating Plants as Electric-Utility Resource Options***
ORNL/CON-352 (April 1994)
L. J. Hill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 4 *Electric-Utility DSM Programs in a Competitive Environment***
ORNL/CON-384 (April 1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 5 *Perspectives on the Future of the Electric Utility Industry***
ORNL/CON-385 (April 1994)
B. Tonn. Oak Ridge National Laboratory, Oak Ridge, Tenn.
A. Schaffhauser. University of Tennessee, Knoxville, Tenn.
- 6 *Process Evaluation of the Regional Biomass Energy Program***
ORNL/CON-374 (March 1994)
C. R. Wilson. University of Tennessee, Knoxville, Tenn.
M. A. Brown, R. D. Perlack. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 7 *Effects of Utility Demand-Side Management Programs on Uncertainty***
Resource and Energy Economics 16(1), p. 25 (March 1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 8 *The Role of Environmental Groups in Electric-Utility Regulation: A Case Study***
The Electricity Journal 7(2), pp. 66-76 (March 1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 9 *Integrated Resource Planning: A Model Rule***
Public Util. Fortn. 131(6), p. 24 (March 1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Blank, B. Driver. Land and Water Fund of the Rockies, Boulder, Col.
- 10 *Effects of Utility Demand-Side Management Programs on Uncertainty***
Resource and Energy Economics 16, pp. 25-45 (1994)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 11 *DSM/IRP Collaboratives: What Have They Accomplished***
Energy Sources 16(1), p. 161 (1994)
M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. English, J. Altman. University of Tennessee, Knoxville, Tenn.

-
- 12 ***U.S. Department of Energy Integrated Resource Planning Program: Accomplishments and Opportunities***
ORNL/CON-370 (December 1993)
D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. E. Mihlmester. Aspen Systems Corp., Oak Ridge, Tenn.
 - 13 ***DSM Today Through 2000***
Electr. Perspect., pp. 65-67 (December 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 14 ***Quantifying Regulatory Disincentives to Utility DSM Programs***
Energy 18(11), p. 1091 (November 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Blank. Land and Water Fund of the Rockies, Boulder, Col.
 - 15 ***An Introduction to Integrated Resource Planning***
Public Power, pp. 40-47 (November 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 16 ***The Role of Environmental Groups in Reforming Electric-Utility Regulation: A Rocky Mountain Case Study***
ORNL/M-3068 (October 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 17 ***Statistical Recoupling: A New Way to Break the Link Between Electric-Utility Sales and Revenues***
ORNL/CON-372 (September 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 18 ***Achievements of the Office of Technical and Financial Assistance Information Services Program: Analysis of Operations and Service Delivery***
ORNL/CON-355 (May 1993)
D. L. White, M. S. Irby. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. A. Beyer. Aspen Systems Corp., Oak Ridge, Tenn.
 - 19 ***Electric-Utility DSM-Program Costs and Effects: 1991 to 2001***
ORNL/CON-364 (May 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 20 ***Interactive Efforts to Address DSM and IRP Issues: Findings From the First Year of a Two-Year Study***
ORNL/CON-357 (April 1993)
M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. English, J. Altman. Energy, Environment, and Resources Center, University of Tennessee, Knoxville, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
 - 21 ***A New Model of Incremental Decision Making for Resource Acquisition by Electric Utilities***
Simulation 60(3), p. 196 (March 1993)
E. Hirst, M. Gettings. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.

-
- 22 *The Social Costs to the U.S. of Monopolization of the World Oil Market, 1972-1991***
ORNL-6744 (March 1993)
D. L. Greene, P. N. Leiby. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 23 *Transportation Energy Data Book: Edition 13***
ORNL/6743 (Edition 13 of ORNL-5198) (March 1993)
S. C. Davis. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. G. Strang. University of Tennessee, Knoxville, Tenn.
- 24 *Regulating as if Customers Matter: Utility Incentives to Affect Load Growth***
ORNL/M-2653 (January 1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Blank. Land and Water Fund of the Rockies, Boulder, Col.
- 25 *The Next Frontier for Integrated Resource Planning and Demand-Side Management***
Electr. J. 6(1), pp. 44-50 (1993)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. Bradford. New York Public Service Commission, Albany, N.Y.
R. Cavanagh. Natural Resource Defense Council, San Francisco, Calif.
C. Harrington. Regulatory Assistance Project, Gardiner, Maine
A. Lovins. Rocky Mountain Institute, Estes Park, Col.
J. Rowe. New England Electric, Westborough, Mass.
S. Wiel. Lawrence Berkeley Laboratory, Berkeley, Calif.
- 26 *A Good Integrated Resource Plan: Guidelines for Electric Utilities and Regulators***
ORNL/CON-354 (December 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 27 *Electric-Utility DSM Programs: 1990 Data and Forecasts to 2000***
ORNL-CON-347 (June 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 28 *Fleet Vehicles in the United States: Composition, Operating Characteristics, and Fueling Practices***
ORNL-6717 (May 1992)
S.-P. Miaou, P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. R. Young. University of Tennessee, Knoxville, Tenn.
- 29 *Effects of Utility DSM Programs on Risk***
ORNL/CON-346 (May 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 30 *Transportation Energy Data Book: Edition 12***
ORNL-6710 (Edition 12 of ORNL-5198) (March 1992)
S. C. Davis. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. D. Morris. University of Tennessee, Knoxville, Tenn.
- 31 *The Demand-Side Management Program Development Process—A Utility Perspective***
ORNL/CON-345 (March 1992)
A. K. Wolfe. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 32 From DSM Technologies to DSM Programs: Issues in Demand-Side Planning for Electric Utilities**
Energy 17(2), pp. 151-60 (February 1992)
L. J. Hill, E. Hirst, M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 33 Public Involvement in Integrated Resource Planning: A Study of Demand-Side Management Collaboratives**
ORNL/CON-344 (February 1992)
J. Raab. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 34 The Role of Evaluation When Electric Utilities Get Financial Incentives for Their DSM Programs**
Evaluation Review 16(1), pp. 93-107 (February 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 35 Making Energy Efficiency Happen**
pp. 205-21, *Technologies for a Greenhouse-Constrained Society*, ed. M. A. Kuliasha, A. Zucker, and K. J. Ballew (Chelsea, Mich.: Lewis Publishers, Inc., 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 36 Data and Analysis Needed to Prepare an Electric-Utility Integrated Resource Plan**
Proceedings of Clean Air Workshop, Columbus, Ohio, May 7-8, 1992 (National Regulatory Research Institute, 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 37 Definitions and Tradeoffs: Cost-Effectiveness of Utility DSM Programs**
Proceedings ACEEE 1992 Summer Study on Energy Efficiency in Buildings, pp. 8.89-8.97 (Washington, D.C.: American Council for an Energy-Efficient Economy, 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 38 Coming to Terms with DSM**
Proceedings ACEEE 1992 Summer Study on Energy Efficiency in Buildings, pp. 7.203-7.205 (Washington, D.C.: American Council for an Energy-Efficient Economy, 1992)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. Sabo. Barakat and Chamberlin, Inc., Washington, D.C.
- 39 The Context and Organization of Demand-Side Management Collaboratives: An Overview**
Proceedings ACEEE 1992 Summer Study on Energy Efficiency in Buildings, pp. 8.141-8.149 (Washington, D.C.: American Council for an Energy-Efficient Economy, 1992)
M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. Raab. Raab Associates, Boston, Mass.
- 40 The Reliability of Residential Energy Conservation Resources**
Proceedings ACEEE 1992 Summer Study on Energy Efficiency in Buildings, pp. 7.267-7.275 (Washington, D.C.: American Council for an Energy-Efficient Economy, 1992)
M. A. Brown, D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.

-
- 41 Handbook of Evaluation of Utility DSM Programs**
ORNL/CON-336 (December 1991)
B. H. Bronfman. Bronfman & Associates, Portland, Ore.
G. L. Fitzpatrick. Applied Energy Group, Inc., Woodbury, N.Y.
E. G. Hicks. New England Power Service Company, Westborough, Mass.
E. Hirst, J. H. Reed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. G. Hoffman, H. Michaels, A. Schon. XENERGY, Burlington, Mass.
K. Keating. Bonneville Power Administration, Portland, Ore.
S. Nadel. American Council for an Energy-Efficient Economy, Washington, D. C.
J. S. Peters. Barakat & Chamberlin, Inc., Portland, Ore.
W. Saxonis. New York State Energy Office, Albany, N.Y.
D. M. Violette. RCG/Hagler, Bailly, Inc., Boulder, Colo.
- 42 Comparison of Methods to Integrate DSM and Supply Resources in Electric-Utility Planning**
ORNL/CON-341 (December 1991)
L. J. Hill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 43 The Effects of Utility DSM Programs on Electricity Costs and Prices**
ORNL/CON-340 (November 1991)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 44 Electric-Utility DSM Programs: Terminology and Reporting Formats**
ORNL/CON-337 (October 1991)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. Sabo. Barakat & Chamberlin, Inc., Washington, D. C.
- 45 Light-Duty Vehicle Summary: First Six Months of Model Year 1991**
ORNL-6672/S1 (August 1991)
P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 46 Improving Energy Efficiency in the USA: The Federal Role Energy Policy**, pp. 567-77 (July/August 1991)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 47 Highway Vehicle MPG and Market Shares Report: Model Year 1992**
ORNL-6672 (April 1991)
L. S. Williams. University of Tennessee, Knoxville, Tenn.
P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 48 Diamond: A Model of Incremental Decision Making for Resource Acquisition by Electric Utilities**
ORNL/CON-315 (February 1991)
M. B. Gettings, E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 49 Demand-Side Management and Integrated Resource Planning: Findings From a Survey of 24 Electric Utilities**
ORNL/CON-314 (February 1991)
M. Schweitzer, E. Hirst, L. J. Hill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 50 Transportation Energy Data Book: Edition 11**
ORNL-6649 (Edition 11 of ORNL-5198) (January 1991)
S. C. Davis, P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.

-
- 51 ***Integrating Demand-Side Management Programs into the Resource Plans of U.S. Electric Utilities***
ORNL/CON-311 (January 1991)
L. J. Hill, E. Hirst, M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 52 ***Possible Effects of Electric-Utility DSM Programs, 1990 to 2010***
ORNL/CON-312 (January 1991)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 53 ***Commercializing Government-Sponsored Computer Software***
Advances in the Implementation and Impact of Computer Systems, ed. M. Fleisher and J. Morrell, pp. 263-75 (Greenwich, Conn.: JAI Press, 1991)
R. K. Goel, M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 54 ***Evaluating Demand-Side Management Programs***
Electric Perspectives 14(6), pp. 24-30 (November/December 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 55 ***Balancing the Scales: Data on Electricity Supply and Demand Resources***
ORNL/CON-306 (September 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 56 ***Energy Efficiency in Nonprofit Agencies: Creating Effective Program Models***
ORNL/TM-11602 (August 1990)
M. A. Brown, D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
B. Prindle. Alliance to Save Energy, Washington, D. C.
M. I. Scherr. United Way of America, Alexandria, Va.
- 57 ***Electricity, Getting More With Less***
Technology Review 93(5), pp. 32-40 (July 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 58 ***Closing The Efficiency Gap: Barriers to Improving Energy Efficiency***
Resources, Conservation and Recycling 3, pp. 276-81 (June 1990)
M. A. Brown, E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 59 ***Demand-Side Data Needs for Least-Cost Utility Planning***
Energy 15(5), pp. 403-12 (May 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. Goldman. Lawrence Berkeley Laboratory, Berkeley, Calif.
- 60 ***Balancing the Scales: Toward Parity in Electric Supply and Demand Data***
The Electricity Journal 3(4), pp. 28-33 (May 1990)
E. A. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 61 ***Key Issues in Electric Utility Integrated Resource Planning: Findings from a Nationwide Study***
ORNL/CON-300 (April 1990)
M. Schweitzer, E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 62 ***Progress and Potential in Evaluating Energy-Efficiency Programs***
Evaluation Review 14(2), pp. 192-205 (April 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 63 The Market Penetration of Energy-Efficiency Programs**
ORNL/CON-299 (April 1990)
L. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 64 Light-Duty Vehicle MPG and Market Shares Report: Model Year 1989**
ORNL-6626 (April 1990)
L. S. Williams. University of Tennessee, Knoxville, Tenn.
P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 65 Why The Federal Government Should Help Improve U.S. Energy Efficiency**
Ambio, A Journal of the Human Environment XIX(2), pp. 96-98 (April 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 66 Demonstrations as a Policy Instrument with Energy Technology Examples**
Knowledge: Creation, Diffusion, and Utilization 11(3): pp. 219-36 (March 1990)
S. M. Macey. Southwest Texas State University, San Marcos, Texas
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 67 Guidelines for a "Good" Integrated Resource Plan**
Public Utilities Fortnightly 125(7), pp. 18-24 (March 1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 68 Assessing Integrated Resource Plans Prepared by Electric Utilities**
ORNL/CON-298 (February 1990)
E. Hirst, M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Yourstone. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. Eto. Lawrence Berkeley Laboratory, Berkeley, Calif.
- 69 Energy Efficiency: How Far Can We Go?**
ORNL/TM-11441 (January 1990)
R. S. Carlsmith. Oak Ridge National Laboratory, Oak Ridge, Tenn.
W. U. Chandler. Battelle-Pacific Northwest Laboratories, Washington, D.C.
J. E. McMahon. Lawrence Berkeley Laboratory, Berkeley, Calif.
D. J. Santini. Argonne National Laboratory, Argonne, Ill.
- 70 The Technology Transfer Process: Background for the U.S. National Energy Strategy**
PNL-SA-17482* (Richland, Wash.: Pacific Northwest Laboratory, January 1990)
D. E. Deonigi, N. L. Moore, S. A. Smith, R. L. Watts. Pacific Northwest Laboratory, Richland, Wash.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. J. Noun. Solar Energy Research Institute, Golden, Colo.
- 71 Flexibility Benefits of Demand-Side Programs in Utility Planning**
The Energy Journal 11(1), pp. 151-65 (1990)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 72 Technology-Transfer Strategies of DOE's Conservation Programs**
Journal of Technology Transfer 15(1), pp. 33-40 (1990)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. H. Major. U.S. Department of Energy, Office of Conservation and Renewable Energy, Washington, D. C.

*Available from Pacific Northwest Laboratory, Post Office Box 999, Richland, Washington 99352.

- 73** *Electric-Utility Resource Planning and Decision Making: The Importance of Uncertainty*
Risk Analysis 10(1), pp. 137-46 (1990)
E. Hirst, M. Schweitzer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 74** *Data Requirements for Utility Integrated Resource Planning*
Energy Systems & Policy 12(4), pp. 219-31 (December 1989)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 75** *Conservation Programs Can Cut Load-Growth Uncertainty for Electric Utilities*
Technological Forecasting and Social Change 36(4), pp. 415-24 (December 1989)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 76** *The Administrative Costs of Energy Conservation Programs*
ORNL/CON-294 (November 1989)
L. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 77** *Comparison of EIA Data Collections: Electricity Supply and Demand*
ORNL/M-998 (October 1989)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 78** *Federal Roles to Realize National Energy-Efficiency Opportunities in the 1990s*
ORNL/CON-290 (October 1989)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 79** *Comparing Building Energy Analysis Software*
Home Energy 6(5), pp. 13-18 (September/October 1989)
P. Weiss. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 80** *Transportation Energy Data Book: Edition 10*
ORNL-6565 (edition 10 of ORNL-5198) (September 1989)
S. C. Davis. University of Tennessee, Knoxville, Tenn.
D. B. Shonka. Shonka Research Associates, Inc., Marietta, Ga.
G. J. Anderson-Batiste, P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 81** *Energy Use and Consumer Dissimilarity in Multifamily Residential Conservation*
Proceedings of the National Energy Program Evaluation Conference, Chicago, August 23-25, 1989, pp. 219-24 (Argonne, Ill.: Argonne National Laboratory, August 1989)
D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 82** *Recent Accomplishments of the U.S. Department of Energy's Least-Cost Utility Planning Program*
ORNL/CON-288 (August 1989)
L. Berry, E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 83** *Light-Duty Vehicle Summary: Model Year 1976 to the First Half of Model Year 1989*
ORNL/M-916 (August 1989)
L. S. Williams. University of Tennessee, Knoxville, Tenn.
P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.

-
- 84 *Electric-Utility Energy-Efficiency and Load-Management Programs: Resources for the 1990s***
ORNL/CON-285 (June 1989)
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 85 *Least-Cost Planning in the Utility Sector: Progress and Challenges. Volume 2: Technical Appendix***
LBL-27131* (June 1989)
C. Goldman, F. Krause, eds. Lawrence Berkeley Laboratory, Berkeley, Calif.
E. Hirst, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 86 *Least-Cost Planning in the Utility Sector: Progress and Challenges***
ORNL/CON-284 (May 1989)
C. Goldman, F. Krause, eds. Lawrence Berkeley Laboratory, Berkeley, Calif.
E. Hirst, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 87 *Light-Duty Vehicle MPG and Market Shares Report: Model Year 1988***
ORNL-6549 (April 1989)
P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. S. Williams, D. J. Beal. University of Tennessee, Knoxville, Tenn.
- 88 *Benefits and Costs of Small, Short-Lead-Time Power Plants and Demand-Side Programs in an Era of Load-Growth Uncertainty***
ORNL/CON-278 (March 1989)
E. A. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 89 *Recent Publications of DOE's Office of Buildings and Community Systems***
ORNL/CON-276 (February 1989)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. Hayes. Applied Management Sciences, Oak Ridge, Tenn.
- 90 *Integrated Resource Planning at Electric Utilities: The Planning Process Evaluation and Program Planning 12*, pp. 213-23 (1989)**
E. Hirst. Oak Ridge National Laboratory, Oak Ridge, Tenn.

*Available from the University of California, Lawrence Berkeley Laboratory, One Cyclotron Road, Berkeley, California 94720.

BUILDING EQUIPMENT RESEARCH

- 91 *Heat Pump Systems With Direct Expansion Ground Coils***
 pp. 40-1-40-21 in *Proceedings, Meeting Customer Needs with Heat Pumps, Dallas, October 15-19, 1991*, EPRI/TR-101944 (Palo Alto, Calif.: Electric Power Research Institute, December 1993)
 O. J. Svec. National Research Council of Canada, Ottawa, Canada
 V. D. Baxter. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 92 *Facts About Triple-Effect Absorption Chiller Cycles***
Gas Industries, pp. 26-28 (September 1993)
 R. C. DeVault. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 G. Grossman. Technion Israel Institute of Technology, Haifa, Israel
- 93 *Enhanced Absorption Cycle Computer Model***
 ORNL/Sub/1-SH641/1 (September 1993)
 G. Grossman, M. Wilk. Technion Israel Institute of Technology, Haifa, Israel
- 94 *Space Conditioning Options in the North: What Is Here and What May Come***
DSM Quarterly, pp. 11-20 (Summer 1993)
 P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 95 *Heat Pump Technology: Responding to New Opportunities***
 pp. 563-72 in *Heat Pumps for Energy Efficiency and Environmental Progress: Proceedings 4th International Energy Agency Heat Pump Conference, Maastricht, Netherlands, April 26-29, 1993* (Amsterdam; New York: Elsevier Science Publishing, 1993)
 V. D. Baxter, F. A. Creswick. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 W. K. Snelson. National Research Council of Canada, Ottawa, Canada
- 96 *Gas-Fueled Space Conditioning Heat Pump Research in the United States***
Heat Pumps for Energy Efficiency and Environmental Progress: Proceedings 4th International Energy Agency Heat Pump Conference, Maastricht, Netherlands, April 26-29, 1993 (Amsterdam; New York: Elsevier Science Publishing, 1993)
 G. H. Myers, S. I. Freedman, C. E. French. Gas Research Institute, Chicago, Ill.
 R. C. DeVault. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 97 *Compressor Calorimeter Performance of Refrigerant Blends—Comparative Methods and Results for a Refrigerator/Freezer Application***
ASHRAE Transactions 99(1), pp. 1447-66 (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1993)
 C. K. Rice, J. R. Sand. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 98 *Laboratory Evaluation of an Ozone-Safe Nonazeotropic Refrigerant Mixture in a Lorenz-Meutzner Refrigerator Freezer Design***
ASHRAE Trans 99(1), pp. 1467-81 (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1993)
 J. R. Sand, E. A. Vineyard, V. D. Baxter. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 99 *An Environmental Rating for Heat Pump Equipment***
p. 67 in *Proceedings Joint U.S./Canada Workshop on Heat Pump Standards for Performance Rating*, Toronto, December 7-8, 1992 (1993)
P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 100 *The Role of Gas Heat Pumps in Electric DSM***
p. 159 in *Proceedings 6th National Demand-Side Management Conference*, Miami Beach, Fla., March 24-26 1993 (1993)
M. Fulmer. Tellus Institute, Boston, Mass.
P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 101 *Refrigeration and Air-Conditioning Technology Workshop: Proceedings of the 1939 Non-Fluorocarbon Refrigeration and Air-Conditioning Technology Workshop, Breckenridge, Colorado, June 23-25, 1993***
ORNL-6797 (1993)
P. J. Lewis, D. M. Counce, eds. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 102 *Report Style Guide for Subcontractors of the Efficiency and Renewables Research Section, Energy Division, Oak Ridge National Laboratory***
ORNL/TM-12082 (September 1992)
T. A. Stone, M. N. Bennett. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 103 *An Assessment of Desiccant Cooling and Dehumidification Technology***
ORNL/CON-309 (July 1992)
V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Z. Lavan. Illinois Institute of Technology, Chicago, Ill.
R. K. Collier, Jr. Collier Engineering Services, Merritt Island, Fla.
G. Meckler. Gershon Meckler Associates, P.C., Herndon, Va.
- 104 *Global Warming Implication of Replacing CFCs: Combining Energy and Fluorocarbon Emission Effects***
ASHRAE Journal 34(4), pp. 14-19 (April 1992)
S. K. Fischer, P. D. Fairchild, P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 105 *Development and Proof-Testing of Advanced Absorption Refrigeration Cycle Concepts. Report on Phases I and IA***
ORNL/Sub/86-17498/1 (March 1992)
R. J. Modahl, F. C. Hayes. The Trane Company, La Crosse, Wisc.
- 106 *Alternatives to CFCs and Global Warming: A Systems Approach to Evaluating Net Contributions***
Materials Research Society Bulletin XVII(3), pp. 39-42 (March 1992)
S. K. Fischer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. McFarland. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- 107 *Modeled Performance of Non-Chlorinated Substitutes for CFC-11 and CFC-12 Centrifugal Chillers***
ORNL/M-2391 (1992)
J. R. Sand, S. K. Fischer. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 108 Market Potential Estimates and R&D Planning for Advanced Absorption Systems for Large Commercial Buildings**
ASHRAE Transactions 98(2), pp. 156-64 (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
J. M. MacDonald, P. J. Hughes, H. A. McLain. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 109 Flow Boiling Enhancement of R22 and a Nonazeotropic Mixture of R143a and R124 Using Perforated Foils**
ASHRAE Transactions 98(2), pp. 402-10 (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
J. C. Conklin, E. A. Vineyard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 110 An Analytical Screening of Alternatives for R-502 in Low-Temperature Refrigerating Applications**
ASHRAE Transactions 98(2), pp. 188-203 (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
S. K. Fischer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 111 Benchmark Performance Analysis of an ECM-Modulated Air-to-Air Heat Pump with a Reciprocating Compressor**
ASHRAE Transactions 98(1), pp. 430-50 (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
C. K. Rice. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 112 Modeled Performance of Non-Chlorinated Substitutes for CFC-11 and CFC-12 in Centrifugal Chillers**
Proceedings of the 1991 International CFC and Halon Alternatives Conference, Baltimore, Md., December 3-12, 1991 (Baltimore, Md.: December 1991)
J. R. Sand, S. K. Fischer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. A. Joyner. Electric Power Research Institute, Palo Alto, Calif.
- 113 Total Equivalent Global Warming Impact: Combining Energy and Fluorocarbon Emission Effects**
Proceedings of the 1991 International CFC and Halon Alternatives Conference, Baltimore, Md., December 3-12, 1991, pp. 790-800 (Baltimore, Md.: December 1991)
P. D. Fairchild, S. K. Fischer, P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 114 Absorption Chillers: Part of the Solution**
Proceedings of the 1991 International CFC and Halon Alternatives Conference, Baltimore, Md., December 3-12, 1991, pp. 364-74 (Baltimore, Md.: December 1991)
P. J. Hughes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
A. J. Occhionero. American Gas Cooling Center, Arlington, Va.
E. A. Reid. Columbia Gas Distribution Company, Columbus, Ohio
- 115 Analysis of Non-CFC Automotive Air Conditioning**
Proceedings of the 1991 International CFC and Halon Alternatives Conference, Baltimore, Md., December 3-12, 1991 (Baltimore, Md.: December 1991)
V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. Sullivan. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Washington, D. C.

- 116 Overview of CFC Replacement Issues for Household Refrigeration**
Proceedings of the 1991 International CFC and Halon Alternatives Conference, Baltimore, Md., December 3-12, 1991, pp. 310-16 (Baltimore, Md.: December 1991)
E. A. Vineyard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. Roke. Fisher & Paykel, Greenmount, Auckland, New Zealand
F. Hallett. Frigidaire, Washington, D. C.
- 117 Computer Model for Simulation of Absorption Systems in Flexible and Modular Form**
ORNL/Sub/90-89673 (August 1991)
G. Grossman, K. Gommed, D. Gadoth. Technion Israel Institute of Technology, Haifa, Israel
- 118 Estimated Size and Performance of a Natural Gas Fired Duplex Stirling for Domestic Refrigeration Applications**
Proceedings of the XVIII International Congress of Refrigeration, Montreal, Canada, August 10-15, 1991 (Paris: International Institute of Refrigeration, 1991)
D. M. Berchowitz. Sunpower, Inc., Athens, Ohio
J. A. Shonder. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 119 Heat Exchanger Thermal Performance for Two Nonazeotropic Refrigerant Mixtures**
Proceedings of the XVIII International Congress of Refrigeration, Montreal, Canada, August 10-15, 1991 (Paris: International Institute of Refrigeration, 1991)
J. C. Conklin, E. A. Vineyard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 120 Advantages of Enthalpy-Temperature Diagrams for Nonazeotropic Refrigerant Mixtures**
Proceedings of the XVIII International Congress of Refrigeration, Montreal, Canada, August 10-15, 1991 (Paris: International Institute of Refrigeration, 1991)
J. C. Conklin, J. R. Sand. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. Granryd. Royal Institute of Technology, Stockholm, Sweden
- 121 Cycle Performance Comparison Between A Nonazeotropic Refrigerant Mixture and R-22**
Proceedings of the XVIII International Congress of Refrigeration, Montreal, Canada, August 10-15, 1991 (Paris: International Institute of Refrigeration, 1991)
E. A. Vineyard, J. C. Conklin. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 122 Tubeside Condensation of Nonazeotropic Refrigerant Mixtures for Two Enhanced Surfaces**
Proceedings of the ASME/JSME Thermal Engineering Joint Conference 3, pp. 251-56 (New York: American Society of Mechanical Engineers, March 1991)
J. C. Conklin, E. A. Vineyard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 123 Heat Transfer of Buried Pipe for Heat Pump Application**
ASME Journal of Solar Energy Engineering 113, pp. 51-55 (February 1991)
V. C. Mei. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 124 Braun Heat Pump Engine/Compressor and its Hermetic Rod Seal**
Proceedings of the 26th Intersociety Energy Conversion Engineering Workshop, Boston, Massachusetts, August 1991 91-2, p. 510 (LaGrange Park, Ill.: American Nuclear Society, Inc., August 1991)
A. T. Braun, M. S. Alam. Tectonics Research, Inc., Minneapolis, Minn.
R. J. Fiskum. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Washington, D. C.

- 125 Options of Desiccant Cooling and Dehumidification Technology**
Proceedings of the 26th Intersociety Energy Conversion Engineering Workshop, Boston, Massachusetts, August 1991 91-2, p. 566 (LaGrange Park, Ill.: American Nuclear Society, Inc., August 1991)
E. Kweller. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Washington, D. C.
V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 126 Residential Absorption Heat Pump Using a Generator-Absorber Heat Exchange Cycle**
Proceedings of the 26th Intersociety Energy Conversion Engineering Workshop, Boston, Massachusetts, August 1991 91-2, p. 498 (LaGrange Park, Ill.: American Nuclear Society, Inc., August 1991)
B. A. Phillips. Phillips Engineering Company, St. Joseph, Mich.
R. C. DeVault. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 127 Natural Gas Fueled Combustor for a 3 kW Output Stirling Engine**
Proceedings of the 26th Intersociety Energy Conversion Engineering Workshop, Boston, Massachusetts, August 1991 91-2, p. 566 (LaGrange Park, Ill.: American Nuclear Society, Inc., August 1991)
W. D. Waldron, G. T. Riecke. Mechanical Technology, Inc., Latham, N.Y.
- 128 Experimental Study of the Effects of Alcohol Additives in Lithium Bromide Water Pool Absorbers**
ASHRAE Transactions 97(2), pp. 403-405 (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1991)
Y. Elkassabgi. Texas A&I University, Kingsville, Texas
H. Perez-Blanco. Pennsylvania State University, University Park, Penn.
- 129 The Alternative Refrigerant Dilemma for Refrigerator-Freezers: Truth or Consequences**
ASHRAE Transactions 97(2), pp. 955-60 (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1991)
E. A. Vineyard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 130 Thermal Performance Analysis for Heat Exchangers Using Nonazeotropic Refrigerant Mixtures**
Proceedings Winter Meeting ASME, Dallas, Texas, November 25-30, 1990, Symposium on Heat Transfer in Advanced Energy Systems AES 18/HTD 151, pp. 25-32 (New York: American Society of Mechanical Engineers, November 1990)
E. Granryd. Royal Institute of Technology, Stockholm, Sweden
J. C. Conklin. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 131 Development of a High-Efficiency, Gas-Fired, Absorption Heat Pump for Residential and Small-Commercial Applications. Phase I Final Report. Analysis of Advanced Cycles and Selection of the Preferred Cycle**
ORNL/Sub/86-24610/1 (September 1990)
B. A. Phillips. Phillips Engineering Co., St. Joseph, Mich.
- 132 Performance Testing of a Commercially Produced Cryogenic Refrigerator**
ORNL/TM-10809 (September 1990)
E. G. Keshock. University of Tennessee, Knoxville, Tenn.
R. W. Murphy. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 133 Initial Parametric Results Using CYCLEZ—An LMTD-Specified, Lorenz-Meutzner Cycle Refrigerator-Freezer Model**
ASHRAE/Purdue CFC Conference Proceedings, pp. 448–58 (West Lafayette, Ind.: Purdue University, July 1990)
C. K. Rice, J. R. Sand. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 134 Thermodynamic Calculations for Mixtures of Environmentally Safe Refrigerants Using the Lee-Kesler-Plöcker Equation of State**
ASHRAE/Purdue CFC Conference Proceedings, pp. 373–82 (West Lafayette, Ind.: Purdue University, July 1990)
S. K. Fischer, J. R. Sand. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 135 Energy Use Impact of CFC Alternatives**
Proceedings of the Fifth Cogeneration and Independent Power Congress, 1990 HVAC & Controls Symposium & Expo Section (Boston, Mass.: Association of Energy Engineers, June 1990)
S. K. Fischer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 136 Development of Design Guidelines for Direct Expansion Ground Coil Heat Exchangers for Ground Coupled Heat Pump Systems**
EPRI CU-6828 (Palo Alto, Calif.: Electric Power Research Institute, May 1990)
V. C. Mei, V. D. Baxter. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 137 An Experimental Evaluation of Two Nonazeotropic Refrigerant Mixtures in a Water-to-Water, Breadboard Heat Pump**
ORNL/M-1117 (April 1990)
M. Kauffield, W. Mulroy, M. McLinden, D. Didion. National Institute of Standards and Technology, Gaithersburg, Md.
- 138 Triple Effect Absorption Chiller Cycle: A Step Beyond Double-Effect Cycles**
Proceedings of the IEA Annex XVI Workshop on High Performance Heat Pumps, Susono City, Japan, Report No. HPB-WR-6, pp. II-27–40 (March 1990)
R. C. DeVault. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 139 A Menu-Driven Program for Determining Properties of Aqueous Lithium Bromide Solutions**
ORNL/TM-11331 (January 1990)
M. R. Patterson, H. Perez-Blanco. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. N. Crosswhite. Oak Ridge Associated Universities, Oak Ridge, Tenn.
- 140 A Magnetically Coupled Stirling Engine Driven Heat Pump: Design Optimization and Operating Cost Analysis**
Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, 2, pp. 204–10 (New York: American Institute of Chemical Engineers, 1990)
R. J. Vincent, W. Waldron. Mechanical Technology, Inc., Latham, N.Y.
- 141 Study of Asymmetric Supersonic Jet Flow for Ejectors**
Thermo-Physical Aspects of Energy Conversion, AES 16, pp. 55–66 (New York: American Society of Mechanical Engineers, 1990)
C. M. Ho. University of Southern California, Los Angeles, Calif.
G. S. Knoke. BDM Inc., Seattle, Wash.
E. W. Geller, H. T. Liu. Flow Research, Inc., Kent, Wash.
W. H. Jou. Flow Research, Inc., Seattle, Wash.
R. W. Murphy, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 142 Hardware Development and Initial Subassembly Test of a Gas-Fired Stirling-Rankine Residential Heat Pump**
Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, 5, pp. 258-63 (New York: American Institute of Chemical Engineers, 1990)
G. Chen, J. McEntee. Sunpower, Inc., Athens, Ohio
- 143 Advanced Absorption Technology Development in the United States Heat Pumps Solving Energy and Environmental Challenges. Proceedings IEA Heat Pump Conference, Tokyo, Japan, March 12-15, 1990**, pp. 69-80 (Pergamon Press, 1990)
R. C. DeVault. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 144 Performances of Four Magnetic Heat Pump Cycles**
Thermo-Physical Aspects of Energy Conversion, AES 16, pp. 103-15 (New York: American Society of Mechanical Engineers, 1990)
F. C. Chen, R. W. Murphy, V. C. Mei. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. L. Chen. Sunpower, Inc., Athens, Ohio
- 145 Energy Technology R&D and the Greenhouse Effect**
Heat Pumps Solving Energy and Environmental Challenges. Proceedings of the IEA Heat Pump Conference, Tokyo, Japan, March 12-15, 1990, pp. 231-41 (Pergamon Press, 1990)
P. D. Fairchild, W. Fulkerson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 146 Absorption Fluids Data Survey. 1989 Update**
ORNL/Sub/84-47989/4 (October 1989)
R. A. Macriss, T. S. Zawacki. Institute of Gas Technology, Chicago, Ill.
- 147 Free-Piston Stirling Engine Magnetically Coupled Heat Pump: Critical Component Evaluation. Phase I Final Report**
ORNL/Sub/86-SA578/1 (August 1989)
G. Chen. Sunpower, Inc., Athens, Ohio
- 148 Laboratory Study of the Dynamic Losses of a Single Speed, Split System Air-to-Air Heat Pump Having Tube and Plate Fin Heat Exchangers**
ORNL/CON-253 (August 1989)
W. A. Miller. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 149 Selection of Ozone-Free, Nonazeotropic Refrigerant Mixtures for Capacity Modulation in Residential Heat Pumps**
ASHRAE Transactions 95(1), pp. 34-46 (Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, June 1989)
E. A. Vineyard, J. R. Sand. Oak Ridge National Laboratory, Oak Ridge, Tenn.
T. G. Statt. Department of Energy, Washington, D.C.
- 150 Refrigerator-Freezer Energy Testing with Alternative Refrigerants CFCs: Time of Transition**, pp. 205-10 (Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, June 1989)
E. A. Vineyard, J. R. Sand, W. A. Miller. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 151 Energy-Use Impact of Chlorofluorocarbon Alternatives**
ORNL/CON-273 (February 1989)
S. K. Fischer, F. A. Creswick. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 152 Dynamic Characteristics Concerned in the Design of a Free-Piston Stirling Engine/Magnetic Coupling/Compressor**
Proceedings of the 24th Intersociety Energy Conversion Engineering Conference, Washington, D.C., August 1989 5, pp. 2219-23 (1989)
G. Chen. Sunpower, Inc., Athens, Ohio
- 153 System Design and Performance Prediction of a Free-Piston Stirling Engine/Magnetic Coupling/Compressor Assembly in a Gas Residential Heat Pump**
Advances in Heat Pumps 1989, AES 7/HTD 125, pp. 81-86 (New York: American Society of Mechanical Engineers, 1989)
G. Chen, W. T. Beale. Sunpower, Inc., Athens, Ohio
- 154 Magnetically Linked Free-Piston Stirling-Refrigerant Compressor Heat Pump**
Analysis and Applications of Heat Pumps, AES 8/SED 6, pp. 57-60 (New York: American Society of Mechanical Engineers, 1989)
G. Chen, W. T. Beale. Sunpower, Inc., Athens, Ohio
- 155 Heat Transfer of Buried Pipe for Heat Pump Application**
Advances in Heat Pumps-1989 AES 7/HTD 125, pp. 23-29 (New York: American Society of Mechanical Engineers, 1989)
V. C. Mei. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 156 Motor Current Signature Analysis A Potential Diagnostic for Air Conditioners**
ASHRAE Transactions 95(1), pp. 312-17 (Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989)
W. A. Miller, H. D. Haynes, F. P. Griffin, W. P. Levins, M. A. Karnitz. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 157 Comparison of Thermoelectric and Vapor Cycle Technologies for Groundwater Heat Pump Application**
ASME Journal of Solar Energy Engineering 111, pp. 353-57 (1989)
V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
B. Mathiprakasam. Midwest Research Institute, Kansas City, Mo.
- 158 Advanced Evacuated Thermal Insulations: The State of the Art**
Thermal Insulation 12, pp. 183-208 (1989)
H. A. Fine. University of Kentucky, Lexington, Ky.

BUILDING THERMAL ENVELOPE SYSTEMS AND MATERIALS

- 159 Thermal Resistance of Attic Loose-Fill Insulations Decreases Under Simulated Winter Conditions**
ORNL/M-3253 (May 1994)
R. S. Graves, K. E. Wilkes, D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 160 A Guidebook for Insulated Low-Slope Roof Systems**
Oak Ridge National Laboratory (February 1994)
International Energy Agency, Buildings and Community Systems Committee, Annex 19 on Low-Slope Roof Systems
- 161 Flood Damage. Guidelines for Restoring Your Home**
Oak Ridge National Laboratory (Spring 1994)
- 162 Evaluation of a Commercial, Computer-Operated Heat Flow Meter Apparatus**
Rev. Sci. Instrum. **64**(7), pp. 1961-70 (July 1993)
R. S. Graves, D. L. McElroy, T. G. Kollie. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 163 The Technical Viability of Alternative Blowing Agents in Polyisocyanurate Roof Insulation: A Cooperative Industry/Government Project**
ORNL/CON-367 (June 1993)
J. E. Christian, G. E. Courville, A. O. Desjarlais, R. S. Graves, R. L. Linkous, D. L. McElroy, F. J. Weaver, R. L. Wendt, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 164 The Impact of Climate on the Drying Times of a Wetted Low-Sloped Roof System**
J. Thermal Insul. and Bldg. Envs. **16**, pp. 234-45 (January 1993)
A. O. Desjarlais, D. M. Kyle, J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 165 Roof System Effects on In-situ Thermal Performance of HCFC Polyisocyanurate Insulation**
Polyurethanes 92: Proceedings of the SPI 34th Annual Technical Marketing Conference, New Orleans, October 20-25, 1992, pp. 400-409 (New York: Society of the Plastics Institute, 1993)
R. S. Graves, D. W. Yarbrough, D. L. McElroy, F. J. Weaver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 166 Thermal Performance of Clean Horizontal Radiant Barriers Under Winter Conditions: Laboratory Measurements and Mathematical Modeling**
ASHRAE Trans **99**(1), pp. 603-13 (Atlanta: American Society of Heating, Ventilating, and Air-conditioning Engineers, 1993)
K. E. Wilkes, P. W. Childs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 167 Use of Radiation Control Coatings to Reduce Building Air-Conditioning Loads**
Energy Sources **15**(1), p. 59 (1993)
D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. W. Anderson. Robert W. Anderson and Associates, Inc., Boulder City, Nev.

- 168 Gauge for Nondestructive Measurement of the Internal Pressure in Powder-filled Evacuated Panel Superinsulation**
Rev. Sci. Instrum. 63(12), pp. 5774-79 (December 1992)
T. G. Kollie, L. S. Thacker. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 169 Literature Review: Heat Transfer Through Two-Phase Insulation Systems Consisting of Powders in a Continuous Gas Phase**
ORNL/M-2426 (December 1992)
D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 170 Moisture Effects in Low-Slope Roofs: Drying Rates After Water Addition with Various Vapor Retarders**
ORNL/CON-308 (October 1992)
C. R. Pedersen. Danish Building Research Institute, Denmark
T. W. Petrie. Marquette University, Milwaukee, Wis.
G. E. Courville, A. O. Desjarlais, P. W. Childs, K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 171 A Study of Changes in Foundation Insulation Levels in the United States**
ORNL/CON-351 (October 1992)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. K. Voss. St. Mary's College, Winona, Minn.
- 172 Numerical Analysis of Heat Transfer by Conduction and Natural Convection in Loose-Fill Fiberglass Insulation—Effects of Convection on Thermal Performance**
ORNL/CON-338 (April 1992)
A. A. Delmas, K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 173 Preliminary Evaluation of Radiation Control Coatings for Energy Conservation in Buildings**
ORNL/Sub/89-SE791/1 (February 1992)
R. W. Anderson. Robert W. Anderson and Associates, Inc., Boulder City, Nev.
- 174 The Effect of Compression on the Material R-Value of Fiberglass Batt Insulation**
J. Thermal Insul. 15 (January 1992)
R. S. Graves, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 175 A Shape Factor Method for Computing Heating Loads from Building Slab-on-Grade Foundations**
pp. 166-75, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7-10, 1992, Clearwater Beach, Florida* (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
W. W. Rust. Oak Ridge Associated Universities, Oak Ridge, Tenn.
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 176 Thermal Performance of Fiberglass and Cellulose Attic Insulations**
pp. 357-67, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7-10, 1992, Clearwater Beach, Florida* (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
K. E. Wilkes, P. W. Childs. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 177 In-Situ Thermal Performance of APP Modified Bitumen Roof Membranes Coated with Reflective Coatings**
pp. 420–28, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7–10, 1992, Clearwater Beach, Florida* (Atlanta: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
J. D. Carlson, T. L. Smith. National Roofing Contractors Association, Rosemont, Ill.
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 178 Energy Efficient Residential Building Foundations Enhance Indoor Air Quality**
ASHRAE Journal 33(11), pp. 36–41 (November 1991)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 179 Moisture Control Handbook: New, Low-rise, Residential Construction**
ORNL/Sub/89-SD350/1 (October 1991)
J. Lstiburek. Building Science Corp., Chestnut Hill, Mass.
J. Carmody. Underground Space Center, University of Minnesota, Minneapolis, Minn.
- 180 Corrosiveness of Wet Residential Building Thermal Insulation Mechanisms and Evaluation of Electrochemical Methods for Assessing Corrosion Behavior**
ORNL/Sub/90-SF204/1 (October 1991)
E. E. Stansbury. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 181 A Round Robin Evaluation of the Corrosiveness of Wet Residential Insulation by Electrochemical Measurements**
ORNL/Sub/90-SF204/2 (October 1991)
E. E. Stansbury. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 182 Laboratory Tests Results on the Thermal Resistance of Polyisocyanurate Foamboard Insulation Blown With CFC-11 Substitutes—A Cooperative Industry/Government Project**
ORNL/TM-11645 (September 1991)
D. L. McElroy, R. S. Graves, D. W. Yarbrough, F. J. Weaver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 183 A Review of Vacuum Insulation Research and Development in the Building Materials Group of the Oak Ridge National Laboratory**
ORNL/TM-11703 (September 1991)
T. G. Kollie, D. L. McElroy, R. S. Graves, F. J. Weaver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
H. A. Fine. University of Kentucky, Lexington, Ky.
K. W. Childs. Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
- 184 Interlaboratory Comparison of Four Heat Flow Meter Apparatuses on Planed Polyisocyanurate Boards Foamed with CFC-11**
ORNL/TM-11720 (June 1991)
R. S. Graves, D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. G. Miller. Jim Walter Research Corp., St. Petersburg, Fla.
D. W. Yarbrough. Tennessee Technological University, Cookeville, Tenn.
R. R. Zarr. National Institute of Standards and Technology, Gaithersburg, Md.
- 185 Technics: Under Steep Roofing**
Progressive Architecture, pp. 54–56 (May 1991)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 186 *Builder's Foundation Handbook***
ORNL/CON-295 (May 1991)
J. Carmody. Underground Space Center, University of Minnesota, Minneapolis, Minn.
J. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. Labs. Undercurrent Design Research, New Haven, Conn.
- 187 *Thermal Properties of Polyisocyanurate Foam Board Insulation Blown With CFC-11 Substitutes***
Proc. Third International Symposium on Roofing Technology, Montreal, Canada, April 17-19, 1991, pp. 133-42 (Rosemont, Ill.: National Roofing Contractors Association, April 1991)
D. L. McElroy, G. E. Courville, J. E. Christian, R. L. Linkous, R. S. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 188 *Steady-State and Transient Tests Using the Unguarded Thin-Heater Apparatus (Thermophysical Properties of Building Materials)***
ORNL/TM-11629 (March 1991)
D. L. McElroy, R. S. Graves, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
H. A. Fine. University of Kentucky, Lexington, Ky.
- 189 *Thermal Performance of HCFC-22 Blown Extruded Polystyrene Insulation Materials: Testing and Applications, 2nd Volume, ASTM STP 1116***, ed. R. S. Graves and D. C. Wysocki, pp. 214-28 (Philadelphia: American Society for Testing and Materials, 1991)
D. W. Yarbrough, R. S. Graves, J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 190 *Thermal Measurement of In-situ and Thin-Specimen Aging of Experimental Polyisocyanurate Roof Insulation Foamed With Alternative Blowing Agents***
Insulation Materials: Testing and Applications, 2nd Volume, ASTM STP 1116, ed. R. S. Graves and D. C. Wysocki, pp. 142-66 (Philadelphia: American Society for Testing and Materials, 1991)
J. E. Christian, G. E. Courville, R. S. Graves, R. L. Linkous, D. L. McElroy, F. J. Weaver, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 191 *ASHRAE Standard 90.2 Envelope Load Factors and Trade-off Procedures***
ASHRAE Transactions 97(2), pp. 928-40 (1991)
M. F. McBride. Owens-Corning Fiberglas, Granville, Ohio
B. A. Wilcox. Berkeley Solar Group, Oakland, Calif.
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 192 *Thermal Mass Credits Relating to Building Envelope Energy Standards***
ASHRAE Transactions 97(2), pp. 941-51 (1991)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 193 *ORNL's Search for Roof Insulation CFC Alternatives***
The Construction Specifier 43(11) (November 1990)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 194 Assessment of the Energy Conservation Potential of Active (Variable Thermal Resistance and Switchable Absorptance) Building Thermal Insulation Systems**
ORNL/TM-11425 (June 1990)
H. A. Fine. University of Kentucky, Lexington, Ky.
D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 195 Fabrication, Evaluation, and Application of Evacuated Panel Insulation (EPI) to Portable Coolers**
ORNL/Sub/88-SD731/1 (March 1990)
R. W. Barito, M. O. Barito. R. W. Barito & Associates, Louisville, Ky.
T. G. Kollie, D. L. McElroy, F. J. Weaver, S. H. Werst, W. Chu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. W. Childs. Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
H. A. Fine. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
H. L. Landrum, Jr. Igloo Products Corp., Houston, Texas
- 196 Chlorofluorocarbon (CFC) Technologies Review of Foamed-Board Insulation for Buildings**
ORNL/TM-11291 (March 1990)
D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. P. Scofield. U.S. Department of Energy, Office of Conservation and Renewable Energy, Washington, D.C.
- 197 Research and Development Data to Define the Thermal Performance of Reflective Materials Used to Conserve Energy in Building Applications**
ORNL/Sub/88-SA835/1 (March 1990)
A. O. Desjarlais, R. P. Tye. Thermatest Division of Holometrix, Inc., Cambridge, Mass.
- 198 Proceedings of the Roof Wind Uplift Testing Workshop, Oak Ridge, Tennessee, November 8-9, 1989**
CONF-891173 (February 1990)
G. E. Courville, comp.; P. S. Gillis, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 199 Thermal Resistance of Fine Powders at Atmospheric Pressure and Under Vacuum**
Insulation Materials, Testing, and Applications, ed. D. L. McElroy and J. F. Kimpflen, ASTM STP 1030, pp. 52-65 (Philadelphia, Pa.: American Society for Testing and Materials, 1990)
D. L. McElroy, F. J. Weaver, D. W. Yarbrough, R. S. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 200 Modeling of Thermal Resistance Test Configurations That Use Thin Heaters**
Insulation Materials, Testing, and Applications, ed. D. L. McElroy and J. F. Kimpflen, ASTM STP 1030, pp. 525-36 (Philadelphia, Pa.: American Society for Testing and Materials, 1990)
D. W. Yarbrough, D. L. McElroy, R. S. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 201 The Most Needed Building Foundations Research Products**
Proceedings of Symposium on Insulation Materials, Testing, and Applications, Bal Harbor, Fla., December 7-9, 1987, STP 1030, pp. 655-62 (Philadelphia: American Society for Testing and Materials, 1990)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 202 *An In Situ Evaluation of the Settling of Loose-Fill Rock Wool Insulation in the Attics of Two Manufactured Home Units***
Proceedings of Symposium on Insulation Materials, Testing, and Applications, Bal Harbor, Fla., December 7-9, 1987, STP 1030, pp. 237-43 (Philadelphia: American Society for Testing and Materials, 1990)
R. S. Graves, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 203 *Evaluation of a Commercial, Portable, Ambient-Temperature Emissometer***
Rev. Sci. Instrum. **61**, pp. 1509-17 (1990)
T. G. Kollie, F. J. Weaver, D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 204 *Buildings Energy Research: A Bibliography Update***
ORNL/CON-292 (December 1989)
R. S. Weaver, L. F. Goins, P. M. Love. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 205 *Catalog of Thermal Bridges in Commercial and Multi-Family Residential Construction***
ORNL/Sub/88-SA407/1 (December 1989)
A. N. Tuluca, D. M. Evans, K. Kuman, M. Krarti. Steven Winter Associates, Inc., New York, N.Y.
K. W. Childs. Martin Marietta Energy Systems, Inc., Oak Ridge, Tenn.
G. E. Courville. Oak Ridge National Laboratory, Oak Ridge, Tenn.
T. Vonier. Thomas Vonier Associates, Inc., Washington, D.C.
R. Tye. Holometrix, Inc., Cambridge, Mass.
- 206 *Measurement of Thermal Drift in Foam Insulation***
ORNL/TM-11290 (October 1989)
G. E. Courville, P. W. Childs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 207 *Overview of the Applicability of Electrochemical Methods to Evaluation of the Corrosiveness of Residential Building Thermal Insulations with Proposed Cooperative Test Program***
ORNL/Sub/87-B8240/1 (September 1989)
E. E. Stansbury. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 208 *U.S. Building Materials Industry: R&D Barriers Assessment***
ORNL/Sub/88-SB964/1 (September 1989)
F. H. Klareich, J. C. Frank. RCG/Hagler, Bailly, Inc., Washington, D.C.
- 209 *Guide for Estimating Differences in Building Heating and Cooling Energy Due to Changes in Solar Reflectance of a Low-Sloped Roof***
ORNL-6527 (August 1989)
E. I. Griggs. Tennessee Technological University, Cookeville, Tenn.
T. R. Sharp, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 210 *Heat and Mass Transfer Through Porous Media***
ORNL/Sub/85-27486/2 (August 1989)
S. Motakef, L. R. Glicksman. Massachusetts Institute of Technology, Cambridge, Mass.
- 211 *Model for Roof Thermal Performance***
ORNL/CON-274 (July 1989)
K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 212** *International Symposium Proceedings on Mathematical Modeling of Roof Systems, Oak Ridge, Tennessee, September 15-16, 1988*
CONF-8809314 (May 1989)
G. E. Courville, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 213** *The Roof Research Center - A National User Facility for Thermal Performance and Durability of Roofing Systems. Users Manual.*
ORNL/M-329/2 (April 1989)
G. E. Courville. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 214** *Design Description of the Large Scale Climate Simulator*
ORNL/TM-10675 (March 1989)
W. R. Huntley. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 215** *Changes in the Heating and Cooling Energy Use in Buildings Due to Lowering the Surface Solar Absorptance of Roofs*
ORNL/TM-10339 (February 1989)
E. I. Griggs. Tennessee Technological University, Cookeville, Tenn.
G. E. Courville. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 216** *An Experimental Study of Stabilized Cellulosic Insulation Installed in Four Attic Sections of Manufactured Homes*
ORNL/TM-10775 (January 1989)
R. S. Graves, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 217** *ZIP—The ZIP-Code Insulation Program (Version 1.0). Economic Insulation Levels for New and Existing Houses by Three-Digit ZIP Code. Users Guide and Reference Manual*
ORNL/TM-11009* (January 1989)
S. R. Petersen. National Institute of Standards and Technology, Gaithersburg, Md.
- 218** *A Capacitance Probe for Measurement of Moisture Content in Open Pore Thermal Insulations*
ORNL/Sub/85-27486/1 (January 1989)
S. Motakef, L. R. Glicksman. Massachusetts Institute of Technology, Cambridge, Mass.
- 219** *The Thermal Resistance of Flat Powder-Filled Evacuated Panels*
Proceedings of the International Conference on Thermal Insulation, San Francisco, California, February 27-March 1, 1989, 5, pp. 20-34 (Sunnyvale, Calif.: Product Safety Corporation, 1989)
R. S. Graves, D. W. Yarbrough, D. L. McElroy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 220** *Testing of Loose-Fill Cellulosic Insulation Taken From Residential Attics in Four Cities*
Proceedings of the Second California Thermal Insulation Conference, Sacramento, California September 18-20, 1989, ed. S. A. Siddiqui, pp. 86-97 (North Highlights, Calif.: Bureau of Home Furnishings and Thermal Insulation, 1989)
R. S. Graves, D. W. Yarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.

*Also available as report no. NISTIR 88-3801 from the National Institute of Standards and Technology, Gaithersburg, Maryland 20899.

- 221 *Proceedings: Thermal Performance of the Exterior Envelopes of Buildings IV, December 4-7, 1989, Orlando, Florida***
Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989
P. M. Love, G. E. Courville, eds. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 222 *Proceedings: 1986 International Daylighting Conference, November 4-7, 1986, Long Beach, California***
Atlanta: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989
E. Bales, ed. New Jersey Institute of Technology, Newark, N.J.
- 223 *Radon Mitigation in New Construction***
Encyclopedia of Architecture: Design, Engineering, and Construction 4, pp. 147-55
(New York: John Wiley & Sons, Inc., 1989)
J. E. Christian. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 224 *Techniques for In Situ Determination of Thermal Resistance of Light Weight Board Insulations***
J. Heat Trans. 111, pp. 274-80 (1989)
G. E. Courville. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. V. Beck. Michigan State University, East Lansing, Mich.
- 225 *The International Energy Agency on Low Slope Roofing Systems***
Int. J. Roofing Technol. 1, pp. 29-31 (1989)
G. E. Courville. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 226 *Comparison of the Dynamic Thermal Performance of Insulated Roof Systems***
Proceedings of the Ninth Conference on Roofing Technology, Gaithersburg, Maryland, May 4-5, 1989, pp. 50-55 (Chicago, Ill.: National Roofing Contractors Association, 1989)
G. E. Courville, P. W. Childs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. H. Shipp. USG Corp., Libertyville, Ill.
T. W. Petrie. Marquette University, Milwaukee, Wis.

DISTRICT HEATING

- 227** *The National Action Plan for District Heating, Cooling and Cogeneration.
An Industry-Government Partnership*
National Planning Committee for District Heating, Cooling and Cogeneration, March
1992*

*Available from M. A. Broders, Oak Ridge National Laboratory, P. O. Box 2008, Oak Ridge TN
37831-6070.

RESIDENTIAL AND COMMERCIAL CONSERVATION PROGRAM

- 228** *Direct Installation of Lighting Measures in Small Nonresidential Buildings*
Proceedings ACEEE 1990 Summer Study on Energy Efficiency in Buildings, Volume 8: Utility Programs, pp. 8.37-8.42 (Washington, D.C.: American Council for an Energy-Efficient Economy, 1990)
M. B. Gettings, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 229** *Life After RCS: Is There a Future for Audit and Other Residential Conservation Programs?*
Home Energy 7(3), pp. 24-28 (1990)
R. Vories. Infinite Energy, Denver, Colo.
D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 230** *Expansion of Electric Utility DSM Services to Small Businesses*
ORNL/CON-293 (September 1989)
M. B. Gettings, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.

WEATHERIZATION ASSISTANCE PROGRAM

- 231 Ten Highly Effective Weatherization Programs**
Home Energy 11(3), p. 23 (May 1994)
M. A. Brown, L. G. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 232 Weatherization Works: An Interim Report of the National Weatherization Evaluation**
ORNL/CON-373 (November 1993)
M. A. Brown, L. G. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. F. Kinney. Synertech Systems Corp., Syracuse, N. Y.
- 233 Keys to Success: Ten Case Studies of Effective Weatherization Programs**
ORNL/CON-328 (November 1993)
M. A. Brown, L. G. Berry, J. O. Kolb, D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. F. Kinney, T. C. Wilson. Synertech Systems Corp., Syracuse, N. Y.
- 234 Weatherization Assistance: The Single-Family Study**
Home Energy 10(5), p. 11 (September 1993)
M. A. Brown, L. G. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 235 National Impacts of the Weatherization Assistance Program in Single-Family and Small Multifamily Dwellings**
ORNL/CON-326 (May 1993)
M. A. Brown, L. G. Berry. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. A. Balzer, E. Faby. Consultants to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 236 Description of the Weatherization Assistance Program in Larger Multifamily Buildings for Program Year 1989**
ORNL/CON-329 (April 1993)
J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 237 The Reach of Low-Income Weatherization Assistance**
Home Energy 10(4), pp. 21-25 (1993)
M. Power. National Community Action Foundation, Washington, D. C.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 238 A Status Report on the National Weatherization Evaluation**
pp. 7.27-7.29, *Proceedings ACEEE 1992 Summer Study on Energy Efficiency in Buildings* (Washington, D. C.: American Council for an Energy-Efficient Economy, 1992)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. A. Beschen. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Washington, D. C.
- 239 Scope of the Weatherization Assistance Program: The Weatherized Population and The Resource Base**
ORNL/CON-325 (May 1992)
M. Power, J. F. Eisenberg, E. Michels. Economic Opportunity Research Institute, Washington, D.C.
M. J. Witherspoon. National Association for State Community Service Programs, Washington, D.C.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 240 Characterization of the Weatherization Assistance Program Network**
ORNL/CON-324 (February 1992)
P. E. Mihlmester, W. C. Koehler, Jr., M. A. Beyer. Aspen Systems Corporation, Oak Ridge, Tenn.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. A. Beschen, Jr. Weatherization Assistance Program, U.S. Department of Energy, Washington, D.C.
- 241 Experimental Plan for the Fuel-Oil Study**
ORNL/TM-11668/V2 (January 1992)
M. P. Ternes, W. P. Levins, M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 242 Interaction of Heating and Cooling Energy Conservation Envelope Measures with Mechanical System Retrofits**
pp. 687-88, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7-10, 1992, Clearwater Beach, Florida* (Atlanta, Ga.: American Society of Heating, Ventilating, and Air-Conditioning Engineers, 1992)
M. B. Gettings. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 243 Evaluation Plan for the Weatherization Assistance Program**
ORNL/TM-11668/V1 (August 1991)
D. A. Beschen. Weatherization Assistance Program, U.S. Department of Energy, Washington, D.C.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 244 Experimental Plan for the Single-Family Study**
ORNL/TM-11668/V3 (September 1991)
L. G. Berry, M. A. Brown, T. Wright, D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 245 Assessment of Weatherization Assistance Program Needs for Improved Residential Measure Selection Techniques**
ORNL/CON-316 (February 1991)
M. B. Gettings, J. O. Kolb. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 246 Measuring the Effects of Conservation Program Special Services: Client Education, Fuel Assistance, and Other Indirect Outcomes**
Affordable Comfort V, 5 (Harrisburg: Pennsylvania Energy Office, 1991)
D. L. White. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 247 The North Carolina Field Test: Experimental Plan**
ORNL/TM-11339 (August 1990)
T. R. Sharp, M. P. Ternes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 248 Implementation of Blower Door and New Client Selection Concepts Into the Iowa Weatherization Assistance Program: Experimental Plan**
ORNL/CON-282 (August 1989)
M. P. Ternes, H. L. Hwang. Oak Ridge National Laboratory, Oak Ridge, Tenn.

EXISTING BUILDINGS RESEARCH PROGRAM

- 249 Cooling Benefits from Exterior Masonry Wall Insulation**
Home Energy 11(2), p. 33 (March 1994)
M. P. Ternes, K. E. Wilkes, H. A. McLain. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 250 Affordable Cooling with Window Air Conditioners**
Home Energy 10(4), p. 23 (July 1993)
M. P. Ternes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 251 Research Update, Existing Buildings Research, 1989-1991**
ORNL/CON-333 (February 1993)
J. M. MacDonald, M. P. Ternes, W. R. Mixon, T. R. Sharp, J. O. Kolb, K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. C. Diamond. Lawrence Berkeley Laboratory, Berkeley, Calif.
R. Judkoff. National Renewable Energy Laboratory, Golden, Colo.
R. P. Mazzocchi. Pacific Northwest Laboratories, Richland, Wash.
- 252 The Oklahoma Field Test: Air-Conditioning Electricity Savings from Standard Energy Conservation Measures, Radiant Barriers, and High-Efficiency Window Air Conditioners**
ORNL/CON-317 (August 1992)
M. P. Ternes, W. P. Levins. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 253 Modeling Study of the Cooling Season Performance of Exterior Wall Insulation**
pp. 655-67, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7-10, 1992, Clearwater Beach, Florida* (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
H. A. McLain. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 254 Energy Savings and Interactions from Retrofit Measures in Small Commercial Buildings in Boston**
pp. 31-38, *Thermal Performance of the Exterior Envelopes of Buildings V, Proceedings of the ASHRAE/DOE/BTECC Conference, December 7-10, 1992, Clearwater Beach, Florida* (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-conditioning Engineers, 1992)
T. R. Sharp, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 255 Monitoring and Evaluation of Foundation Insulation Retrofits in Single-Family Detached Houses in St. Paul and Minneapolis, Minnesota. Final Report**
ORNL/Sub/86-SA711/V (October 1991)
M. J. Hewett. Center for Energy and the Urban Environment, Minneapolis, Minn.
G. D. Nelson. Gary Nelson and Associates, Minneapolis, Minn.
M. T. Noble. Natural Resources Corp., Minneapolis, Minn.
D. A. Robinson. Robinson Technical Services, St. Paul, Minn.
L. S. Shen, L. F. Goldberg. University of Minnesota, Minneapolis, Minn.

- 256 Monitoring and Evaluation of Replacing Low-Efficiency Air Conditioners with High-Efficiency Air Conditioners in Single-Family Detached Houses in Austin, Texas**
ORNL/Sub/86-SA566/V (August 1991)
R. Burns, R. E. Hough. The Fleming Group, East Syracuse, N.Y.
- 257 Thermal Model of Attic Systems with Radiant Barriers**
ORNL/CON-262 (July 1991)
K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 258 Radiant Barrier Attic Fact Sheet**
DOE/CE-0335P, ORNL/M-1937 (June 1991)
K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 259 Analysis of Annual Thermal and Moisture Performance of Radiant Barrier Systems**
ORNL/CON-319 (April 1991)
K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 260 The National Fuel End-Use Efficiency Field Test: Energy Savings and Performance of an Improved Energy Conservation Measure Selection Technique**
ORNL/CON-303 (March 1991)
M. P. Ternes, P. S. Hu, L. S. Williams. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. Goewey. National Fuel Gas Distribution Corp., Buffalo, N.Y.
- 261 Measured Space-Cooling Electricity Savings from Standard Energy Conservation Measures, Radiant Barriers, and High-Efficiency Window Air Conditioners**
Proceedings of the ACEEE 1990 Summer Study on Energy Efficiency in Buildings 9, pp. 299-308 (Washington, D.C.: American Council for an Energy-Efficient Economy, August 1990)
M. P. Ternes, W. P. Levins. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 262 Analysis of Annual Energy Savings Due to Radiant Barriers**
Proceedings of the ACEEE 1990 Summer Study on Energy Efficiency in Buildings 1, pp. 235-45 (Washington, D.C.: American Council for an Energy-Efficient Economy, August 1990)
K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 263 Measurement of Energy Performance in a Small Bank Building**
ORNL/CON-297 (April 1990)
T. R. Sharp, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 264 Cooling Season Energy Measurements of Dust and Ventilation Effects on Radiant Barriers**
ORNL/CON-271 (March 1990)
W. P. Levins, M. A. Karnitz. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. A. Hall. Tennessee Valley Authority, Knoxville, Tenn.
- 265 Power Generation from Waste Incineration**
Energy Engineering 87(3), pp. 49-62 (1990)
J. O. Kolb, K. E. Wilkes. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 266 Energy Savings and Performance of an Improved Energy Efficiency Measure Selection Technique**
ASHRAE Transactions 96(Pt. 2) (Atlanta, Ga.: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1990)
M. P. Ternes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 267 A Protocol for Monitoring Energy Efficiency Improvements in Commercial and Related Buildings**
ORNL/CON-291 (September 1989)
J. M. MacDonald, T. R. Sharp, M. B. Gettings. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 268 Protocols Are Being Developed to Guide Building Energy Monitoring Projects**
ASHRAE Journal 31(6), p. 38 (June 1989)
W. R. Mixon. Oak Ridge National Laboratory, Oak Ridge, Tenn.
H. Misuriello. W. S. Fleming Associates, Washington, D.C.
- 269 Technology Adoption Strategy for the Existing Buildings Efficiency Research Program**
ORNL/CON-286 (June 1989)
P. E. Mihlmester, J. Gonos, L. Freeman. Applied Management Sciences, Inc., Oak Ridge, Tenn.
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 270 Investigation of Metered Data Analysis Methods for Commercial and Related Buildings**
ORNL/CON-279 (May 1989)
J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. M. Wasserman. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 271 Moisture Measurements in Single-Family Houses with Attics Containing Radiant Barriers**
ORNL/CON-255 (February 1989)
W. P. Levins, M. A. Karnitz. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. A. Hall. Tennessee Valley Authority, Chattanooga, Tenn.
- 272 The Oklahoma Cooling Retrofit Field Test: Experimental Plan**
ORNL/TM-10761 (January 1989)
M. P. Ternes, P. S. Hu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 273 Load Impacts of Energy Management Hardware**
Proceedings of the End-Use Load Information and Application Conference for Customer and Utility Communication, Syracuse, New York, May 16-17, 1989 (Syracuse, N.Y.: The Fleming Group, 1989)
J. M. MacDonald, T. R. Sharp. Oak Ridge National Laboratory, Oak Ridge, Tenn.

CERAMIC TECHNOLOGY PROJECT

- 274 Creep and Stress Rupture Behavior of an Advanced Silicon Nitride: Part I, Experimental Observations**
J. Am. Ceram. Soc. **77**(5), p. 1217-27 (May 1994)
M. N. Menon, H. T. Fang, D. C. Wu. AlliedSignal, Inc., Phoenix, Ariz.
M. G. Jenkins. University of Washington, Seattle, Wash.
M. K. Ferber, K. L. More, C. R. Hubbard, T. A. Nolan. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 275 Creep and Stress Rupture Behavior of an Advanced Silicon Nitride: Part II, Creep Rate Behavior**
J. Am. Ceram. Soc. **77**(5), p. 1228-34 (May 1994)
M. N. Menon, H. T. Fang, D. C. Wu. AlliedSignal, Inc., Phoenix, Ariz.
M. G. Jenkins. University of Washington, Seattle, Wash.
M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 276 Creep and Stress Rupture Behavior of an Advanced Silicon Nitride: Part III, Stress Rupture and the Monkman-Grant Relationship**
J. Am. Ceram. Soc. **77**(5), p. 1235-41 (May 1994)
M. N. Menon, H. T. Fang, D. C. Wu. AlliedSignal, Inc., Phoenix, Ariz.
M. G. Jenkins. University of Washington, Seattle, Wash.
M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 277 Creep and Creep Rupture of an Advanced Silicon Nitride Ceramic**
J. Am. Ceram. Soc. **77**(4), pp. 867-74 (April 1994)
J. L. Ding. Washington State University, Pullman, Wash.
K. C. Liu, K. L. More, C. R. Brinkman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 278 Effect of Relative Humidity of Repetitive Impact Behavior of Machined Silicon Nitride**
J. Am. Ceram. Soc. **77**(3), p. 683 (March 1994)
S. Srinivasan, P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 279 Materials Development Program Ceramic Technology Project Bibliography (1984-1992)**
ORNL/M-3201 (March 1994)
S. G. Winslow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 280 Ceramic Technology Project Database: September 1993 Summary Report**
ORNL/M-3155 (January 1994)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 281 Thermal Shock Behavior of Silicon Nitride Flexure Beam Specimens with Indentation Cracks**
J. Am. Ceram. Soc. **77**(3), pp. 835-38 (1994)
S. R. Choi, J. A. Salem. NASA Lewis Research Center, Cleveland, Ohio
- 282 Life Prediction Methodologies and Data for Ceramic Materials**
ASTM Special Technical Publication 1201 (Philadelphia: American Society for Testing and Materials, 1994)
C. R. Brinkman, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. F. Duffy, ed. NASA Lewis Research Center, Cleveland, Ohio

- 283 Fracture of Silicon Nitride and Silicon Carbide at Elevated Temperatures**
Materials Science and Engineering A176, pp. 51–60 (1994)
S. M. Wiederhorn, B. A. Fields, B. J. Hockey. National Institute of Standards and Technology, Gaithersburg, Md.
- 284 Beneficial Effects of Cyclic Tensile Loading on the Fatigue Resistance of an Si_3N_4**
J. Mat. Sci. Letters 12(24), pp. 1940–44 (December 1993)
M. G. Jenkins. University of Washington, Seattle, Wash.
M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C.-K. J. Lin. Oak Ridge Institute for Science and Education, Oak Ridge, Tenn.
- 285 Role of Oxidation in the Time-Dependent Failure Behavior of HIPed Silicon Nitride at 1370°C**
J. Am. Ceram. Soc. 76(11), p. 2919 (November 1993)
A. A. Wereszczak, K. Breder, M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 286 Ceramic Technology Project Semiannual Progress Report for October 1992 Through March 1993**
ORNL/TM-12428 (September 1993)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 287 Application of Microwave Heating for Fabrication of Silicon Nitride Ceramics**
Ceramic Engineering and Science Proceedings September–October 1993. 17th Annual Conference on Composites and Advanced Ceramic Materials 14(9/10), pp. 74452 (Westerville, Ohio: American Ceramic Society, 1993)
T. N. Tieggs, J. O. Kiggans, K. L. Ploetz. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 288 Development of Improved Processing and Evaluation Methods for High Reliability Structural Ceramics for Advanced Heat Engine Applications, Phase I**
ORNL/Sub/89-SB182/1 (August 1993)
V. K. Pujari, D. M. Tracey, M. R. Foley, N. I. Paille, P. J. Pelletier, L. C. Sales, C. A. Willkens, R. L. Yeckley. Saint-Gobain/Norton Industrial Ceramics, Northboro, Mass.
- 289 Ceramic Technology Project Semiannual Progress Report for April 1992 Through September 1992**
ORNL/TM-12363 (July 1993)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 290 Survey of Ceramic Machining in Japan**
ORNL/M-2881 (July 1993)
B. P. Bandyopadhyay. University of North Dakota, Grand Forks, N. D.
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 291 Ceramic Technology Project Data Base: September 1992 Summary Report**
ORNL/M-2775 (June 1993)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 292 Studies of Dynamic Contact of Ceramics and Alloys for Advanced Heat Engines**
ORNL/Sub/84-00216/2 (June 1993)
P. A. Gaydos, K. F. Dufrane. Battelle Memorial Institute, Columbus, Ohio

- 293 Analytical and Experimental Evaluation of Joining Silicon Nitride to Metal and Silicon Carbide to Metal for Advanced Heat Engine Applications**
ORNL/Sub/90-SB047/2 (May 1993)
S. Kang, J. H. Selverian, D. O'Neil, H. Kim, K. Kim. GTE Laboratories, Waltham, Mass.
- 294 Cost-Effective Ceramic Machining Highlights**
ORNL/M-2827 (May 1993)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 295 Low-Expansion Ceramics Initiative**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 367-70 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
D. P. Stinton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. W. Richerson. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 296 The Drive to Cost-Effective Structural Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 353-59 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
R. B. Schulz. Office of Energy Efficiency and Renewable Energy, Department of Energy, Washington, D. C.
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 297 Development of a Constitutive Model for Creep and Life Prediction of Advanced Silicon Nitride Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 583-92 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
J. L. Ding. Washington State University, Pullman, Wash.
K. C. Liu, C. R. Brinkman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 298 Cost-Effective Ceramic Machining Program**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 361-65 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 299 Overview of NDE Development**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 433-41 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
R. W. McClung. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 300 Processing Methodology for the Production of Reliable High Strength Silicon Nitride**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 433-49 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
V. K. Pujari, D. M. Tracey, M. R. Foley, N. I. Paille, P. J. Pelletier, L. C. Sales, C. A. Willkens, R. L. Yeckley. Saint-Gobain/Norton Industrial Ceramics, Northboro, Mass.
- 301 Recent Advances in the Development of HEXOLOY SX-SiC**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 451-63 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
G. V. Srinivasan, S. K. Lau, R. S. Storm. The Carborundum Company, Niagara Falls, N. Y.

- 302 In Situ Reinforced Si₃N₄**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 465-69 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
H. Yeh, J. Yamanis, C.-W. Li, J. Pollinger, E. Solidum, M. Behi. AlliedSignal, Inc., Torrance, Calif.
- 303 Progress in Life Prediction Methodology for Ceramic Components of Advanced Heat Engines**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 471-84 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
J. C. Wade, J. S. Cuccio, H. T. Fang, K. Seybold. AlliedSignal, Inc., Phoenix, Az.
- 304 Mechanical Testing of Candidate Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 555-65 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
N. L. Hecht, S. M. Goodrich, L. Chuck, D. E. McCullum. University of Dayton Research Institute, Dayton, Ohio
- 305 Thick Thermal Barrier Coatings**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 567-72 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
M. B. Beardsley. Caterpillar, Inc., Peoria, Ill.
- 306 Development of Wear-Resistant Ceramic Coatings for Diesel Engine Applications**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 573-76 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
M. H. Haselkorn, F. A. Kelley. Caterpillar, Inc., Peoria, Ill.
- 307 Silicon Nitride Powders Processing in High Energy Agitation Mill**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, Dearborn, Mich., Nov. 2-5, 1992, pp. 577-81 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
S. G. Malghan, D. B. Minor. National Institute of Standards and Technology, Gaithersburg, Md.
- 308 Brazing Titanium-Vapor-Coated Zirconia**
Weld. Res. Suppl., pp. 165s-72s (April 1993)
M. L. Santella, J. J. Pak. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 309 An Ultrasonic Evaluation of Silicon Carbide Whisker-Reinforced Ceramic Composites**
Mater. Eval. 51(3), pp. 391-95 (March 1993)
W. A. Simpson, Jr. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. W. McClung. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 310 Fracture Toughness of Advanced Ceramics at Room Temperature: A VAMAS Round Robin**
Ceramic Engineering and Science Proceedings July–August 1993. 17th Annual Conference on Composites and Advanced Ceramic Materials 14(7/8), part 1, pp. 92–100 (Westerville, Ohio: American Ceramic Society, 1993)
G. D. Quinn. National Institute of Standards and Technology, Gaithersburg, Md.
- 311 Fracture Toughness (K_{Ic} & γ_{wof}) of a HIPed Si_3N_4 at Elevated Temperatures**
Ceramic Engineering and Science Proceedings July–August 1993. 17th Annual Conference on Composites and Advanced Ceramic Materials 14(7/8), part 1, pp. 101–12 (Westerville, Ohio: American Ceramic Society, 1993)
A. A. Wereszczak, M. K. Ferber, R. R. Sanders. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. G. Jenkins. University of Washington, Seattle, Wash.
P. Khandelwal. Allison Gas Turbine Division, General Motors Corp., Indianapolis, Ind.
- 312 Analysis of Pull-Tests for Determining the Effects of Ion Implantation on the Adhesion of Iron Films to Sapphire Substrates**
J. Adhesion Sci. Tech. 7(8), p. 845 (1993)
J. E. Pawel, C. J. McHargue. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 313 A Mechanical Extensometer for High Temperature Tensile Testing of Ceramics**
J. Test. Eval., pp. 406–13 (1993)
K. C. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. L. Ding. Washington State University, Pullman, Wash.
- 314 Nondestructive Testing of Ceramics for Vehicular Advanced Heat Engines**
Proceedings of the Spring Conference of the American Society for Nondestructive Testing, Orlando, Fla., March 30–April 13, 1992, p. 105 (Atlanta: American Society of Mechanical Engineers, 1993)
R. W. McClung. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 315 Microwave Processing of Silicon Nitride for Advanced Gas Turbine Applications**
Proceedings 38th ASME International Gas Turbine and Aeroengine Congress/Exhibition, Cincinnati, May 24–27, 1993 (New York: American Society of Mechanical Engineers, 1993)
T. N. Tiegs, J. O. Kiggans. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 316 Development of ASTM Standards in Support of Advanced Ceramics Development**
Proceedings 38th ASME International Gas Turbine and Aeroengine Congress/Exhibition, Cincinnati, May 24–27, 1993, pp. 1–11 (New York: American Society of Mechanical Engineers, 1993)
C. R. Brinkman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. D. Quinn. National Institute of Standards and Technology, Gaithersburg, Md.
R. W. McClung. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 317 Strength Optimization Through Powder Modification**
Proceedings of the Fall Meeting, Materials Research Society, Boston, Nov. 30–Dec. 4, 1992 287, pp. 295–302 (Pittsburgh: Materials Research Society, 1993)
A. Pasto. Oak Ridge National Laboratory, Oak Ridge, Tenn.
F. S. Avella, S. Natansohn. GTE Labs, Inc., Waltham, Mass.
W. J. Rourke. Duracell Worldwide Technology Center, Needham, Mass.
- 318 Apparent Enhanced Fatigue Resistance under Cyclic Tensile Loading for a HIPed Silicon Nitride**
J. Am. Ceram. Soc. 76(3), pp. 788–92 (1993)
M. G. Jenkins, M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C.-K. J. Lin. Oak Ridge Institute for Science and Education, Oak Ridge, Tenn.
- 319 Development of Adherent Ceramic Coatings to Reduce Contact Stress Damage of Ceramics**
ORNL/Sub/89-95915/2 (November 1992)
S. F. Wayne, J. H. Selverian, D. O'Neil. GTE Laboratories, Inc., Waltham, Mass.
- 320 Evaluation of Sialon Internal Combustion Engine Components and Fabrication of Several Ceramic Components for Automotive Applications**
ORNL/M-22553 (October 1992)
C. H. McMurtry, M. O. Ten Eyck. The Carborundum Company, Niagara Falls, N.Y.
- 321 Development of Improved Processing Methods for High Reliability Structural Ceramics for Advanced Heat Engines**
ORNL/Sub/89-SD548/1 (July 1992)
A. E. Pasto, S. Natansohn. GTE Laboratories, Inc., Waltham, Mass.
- 322 Ceramic Technology Project Database: March 1990 Summary Report**
ORNL/M-1860 (July 1992)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 323 Ceramic Technology Project Database: September 1991 Summary Report**
ORNL/M-1862 (June 1992)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 324 Ceramic Technology Project Database: September 1990 Summary Report**
ORNL/M-1861 (June 1992)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 325 Development of Wear-Resistant Ceramic Coating for Diesel Engine Components, Volume 1: Coating Development and Tribological Testing, Final Report**
ORNL/Sub/87-SA581/1 (June 1992)
M. G. S. Naylor. Cummins Engine Company, Inc., Columbus, Ind.
- 326 Development of Ceramic Matrix Composites for Application in the Ceramic Technology for Advanced Heat Engines Project Phase IIA. Development of In-Situ Toughened Silicon Nitride**
ORNL/Sub/85-22008/3 (June 1992)
J. Pollinger, D. Newson, H. Yeh, E. Solidum, J. Yamanis, M. Behi, C.-W. Li, P. Whalen.
Garrett Ceramic Components Division, Torrance, Calif.

- 327 Reliability Improvements of High Strength Silicon Nitride Through Process Optimization and Control**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 137-44 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
V. K. Pujari, D. M. Tracey, N. D. Corbin, M. R. Foley, A. K. Garg, N. I. Paille, P. J. Pelletier, L. C. Sales, C. A. Willkens, R. L. Yeckley. Norton Co., Northboro, Mass.
- 328 Life Prediction Methodology of Ceramic Engine Components**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 253-59 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
P. K. Khandelwal, D. L. Vaccari. Allison Gas Turbine Division, General Motors Corp., Indianapolis, Ind.
- 329 Progress in Life Prediction Methodology for Ceramic Components of Advanced Heat Engines**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 261-72 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
H. T. Fang, J. S. Cuccio, J. C. Wade, K. G. Seybold. AlliedSignal, Inc., Phoenix, Ariz.
M. G. Jenkins. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 330 Tensile Creep Testing of Structural Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 273-80 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
S. M. Wiederhorn, R. Krause, D. C. Cranmer. National Institute of Standards and Technology, Gaithersburg, Md.
- 331 Evaluation of the Elevated-Temperature Mechanical Reliability of a HIPed Silicon Nitride**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 281-91 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
M. K. Ferber, M. G. Jenkins. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 332 Creep Testing of SNW-1000 Sintered Silicon Nitride**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 293-305 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
J. Sankar, A. D. Kelkar, R. Vaidyanathan, J. Gao. North Carolina A&T State University, Greensboro, N.C.
- 333 Statistical Procedures for Estimating Component Strengths and Associated Confidence Bounds**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 385-95 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
C. A. Johnson, W. T. Tucker. General Electric Corporate Research and Development, Schenectady, N.Y.

- 334 Mechanical Testing of Candidate Si_3N_4 Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 397-401 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
N. L. Hecht, S. M. Goodrich, L. Chuck, D. E. McCullum. University of Dayton Research Institute, Dayton, Ohio
- 335 Wear-Resistant Ceramic Coatings**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 403-15 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
M. G. S. Naylor. Cummins Engine Co., Inc., Columbus, Ind.
- 336 Development of Wear Resistant Ceramic Coatings for Diesel Engines**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 417-24 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
M. H. Haselkorn, F. A. Kelley. Caterpillar, Inc., Peoria, Ill.
- 337 The Cost-Effective Ceramic Machining Program Plan**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 425-31 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 338 Nondestructive Evaluation Development for Process Control of Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 433-37 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
W. A. Ellingson, D. L. Holloway, E. A. Sivers. Argonne National Laboratory, Argonne, Ill.
J. Ling. Chinese Academy of Sciences.
J. P. Pollinger, H. C. Yeh. AlliedSignal, Inc., Torrance, Calif.
- 339 Development of Ultra-Low-Expansion Ceramics: CMZP and CMZP Matrix Composites**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 145-57 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
D. A. Hirschfeld, Y. P. Yang, T. K. Li, J. J. Brown. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 340 In-Situ Reinforced Silicon Nitride**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 159-65 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
H. Yeh, D. Newson, J. Pollinger, E. Solidum. AlliedSignal, Inc., Torrance, Calif.
J. Yamanis, M. Behi, C.-W. Li, P. Whalen. AlliedSignal, Inc., Morristown, N. J.
- 341 Improved Processing of Ceramic Composites and Cost Effective Sintering of Si_3N_4**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 167-70 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
D. E. Wittmer, T. E. Paulson, D. Doshi. Southern Illinois University, Carbondale, Ill.
C. W. Miller, Jr. Centorr Furnaces/Vacuum Industries, Nashua, N. H.

- 342 Scalability Demonstration Program for Silicon Nitride by the Sullivan™ Process for Advanced Ceramics**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 171-75 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
T. M. Sullivan. Sullivan Mining Corp., San Diego, Calif.
- 343 Development of a High Temperature Hexoloy SX Silicon Carbide**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 177-81 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
K. Chia, G. V. Srinivasan, S. K. Lau, R. S. Storm. The Carborundum Company, Niagara Falls, N. Y.
- 344 Development of Si_3N_4 in the System Si_3N_4 - Y_2O_3 - SiO_2 - MO_2 C**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 247-51 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
B. Mikijelj, J. Mangels. Ceradyne, Inc., Costa Mesa, Calif.
- 345 Tribology of Improved Transformation-Toughened Ceramics-Heat Engine Test. Final Report**
ORNL/Sub/90-SG372/1 (April 1992)
E. Lilley, G. A. Rossi, P. J. Pelletier, Norton Company, Northboro, Mass.
- 346 Material Development in the Si_3N_4 System Using Glass Encapsulated Hip'ing. Final Report, Phase II**
ORNL/Sub/86-95906/2 (April 1992)
N. D. Corbin, G. J. Sundberg, K. N. Siebein, C. A. Willkens, V. K. Pujari, G. A. Rossi, J. S. Hansen, C. L. Chang, J. L. Hammarstrom. Norton Company, Northboro, Mass.
- 347 Analytical and Experimental Evaluation of Joining Ceramic Oxides to Ceramic Oxides and Ceramic Oxides to Metal for Advanced Heat Engine Applications. Final Report**
ORNL/Sub/87-SB046/1 (April 1992)
J. Ahman, B. Majumdar, A. R. Rosenfield, S. L. Swartz, J. Cawley, E. Park, D. Hauser, A. T. Hopper. Battelle Columbus Laboratories, Columbus, Ohio
- 348 Effect of Translucence of Engineering Ceramics on Heat Transfer in Diesel Engines. Final Report.**
ORNL/Sub/88-22042/2 (April 1992)
S. Wahiduzzaman, T. Morel. Integral Technologies Inc., Westmont, Ill.
- 349 Interference of Wedge-Shaped Protrusions on the Faces of a Griffith Crack in Biaxial Stress. Final Report**
ORNL/Sub/87-07685/2 (April 1992)
J. A. M. Boulet. University of Tennessee, Knoxville, Tenn.
- 350 Development of Low-Expansion Ceramics for Diesel Engine Applications. Final Report**
ORNL/Sub/86-22049/1 (April 1992)
J. J. Brown, Jr. Virginia Polytechnic Institute and State University, Blacksburg, Va.

- 351 Development of Ceramic Matrix Composites for Application in Ceramic Technology for Advanced Heat Engine Program. Final Report**
ORNL/Sub/85-22011/2 (April 1992)
S. T. Buljan, J. G. Baldoni, M. L. Huckabee, J. Neil, J. Hefter. GTE Laboratories, Inc., Waltham, Mass.
- 352 Development of Ceramic Matrix Composites for Application in Ceramic Technology for Advanced Heat Engine Program. Final Report, Phase II**
ORNL/Sub/85-22008/2 (April 1992)
H. Yeh, E. Solidum, K. Karasek, G. Stranford, D. Yuhas, J. Schienle, S. Bradley. AlliedSignal, Inc., Torrance, Calif.
- 353 Analytical and Experimental Evaluation of Joining Silicon Carbide to Silicon Carbide and Silicon Nitride to Silicon Nitride for Heat Engine Applications. Final Report**
ORNL/Sub/87-SB045/1 (April 1992)
M. R. Foley, G. A. Rossi, G. J. Sundberg, J. A. Wade, F. J. Wu. Norton Company, Northboro, Mass.
- 354 Development of Adherent Ceramic Coatings to Reduce Contact Stress Damage of Ceramics. Final Report**
ORNL/Sub/86-95915/1 (April 1992)
C. D'Angelo, H. J. Kim, D. W. Oblas, H. E. Rebenne, V. K. Sarin. GTE Laboratories, Inc., Waltham, Mass.
- 355 Processing of Sinterable Transformation Toughened Ceramics for Application in Ceramic Technology for Advanced Heat Engines Project. Final Report, Phase II**
ORNL/Sub/85-22031/2 (April 1992)
E. Lilley, G. A. Rossi. Norton Company, Northboro, Mass.
- 356 Interference of Wedge-Shaped Protrusions on the Faces of a Griffith Crack in Biaxial Stress. Final Report**
ORNL/Sub/87-07685/1 (April 1992)
J. A. M. Boulet. University of Tennessee, Knoxville, Tenn.
- 357 Evaluation of Silicon Nitride Internal Combustion Engine Components. Final Report**
ORNL/Sub/89-SE500/1 (April 1992)
W. Voldrich. Garrett Ceramic Components Division, Torrance, Calif.
- 358 Studies of Dynamic Contact of Ceramics and Alloys for Advanced Heat Engines. Final Report**
ORNL/Sub/84-00216/1 (April 1992)
P. A. Gaydos, K. F. Dufrane. Battelle Columbus Division, Columbus, Ohio
- 359 Engine Testing of Ceramic Cam-Roller Followers**
ORNL/Sub/90-SF985/1 (April 1992)
Y. Kalish. Detroit Diesel Corporation, Detroit, Mich.
- 360 Development of Wear Resistant Ceramic Coatings for Diesel Engine Components. Final Report**
ORNL/Sub/87-SA582/1 (April 1992)
M. H. Haselkorn. Caterpillar, Inc., Peoria, Ill.

- 361 Reinforcements for High Temperature Ceramics. Final Report**
ORNL/Sub-90/SB688/1 (April 1992)
C. I. Kyriacou, J. L. Sepulveda, M. A. Watson. Keramont, Tucson, Ariz.
- 362 Ceramic Technology Project Semiannual Progress Report for April 1991 Through September 1991**
ORNL/TM-11984 (March 1992)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 363 The Cost of Silicon Nitride Powder: What Must It Be To Compete?**
ORNL-6694 (February 1992)
S. Das, T. R. Curlee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 364 A Review of Techniques for Joining Advanced Ceramics**
Am. Ceram. Soc. Bull. **71**(6), pp. 947-54 (1992)
M. L. Santella. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 365 Pressure Casting Process Control by Ultrasonic Technique**
Ceramic Engineering & Science Proceedings **13**(7), pp. 536-45 (Westerville, Ohio: American Ceramic Society, 1992)
V. K. Pujari, L. C. Sales. Norton Co., Northboro, Mass.
J. S. Wang, J. Fraser. Precision Acoustics Devices, Inc., Fremont, Calif.
- 366 Continuous Sintering of Si_3N_4 in a Controlled Atmosphere Belt Furnace**
Ceramic Engineering & Science Proceedings **13**(7), pp. 546-61 (Westerville, Ohio: American Ceramic Society, 1992)
D. E. Wittmer, T. E. Paulson. Southern Illinois University, Carbondale, Ill.
C. W. Miller, Jr. Centorr Furnaces/Vacuum Industries, Nashua, N. H.
- 367 Twisting and Friction Errors in Flexure Testing**
Ceramic Engineering & Science Proceedings **13**(7), pp. 319-30 (Westerville, Ohio: American Ceramic Society, 1992)
G. D. Quinn. National Institute of Standards and Technology, Gaithersburg, Md.
- 368 Ceramic-Metal Joints Brazed with Palladium Alloys**
J. Am. Welding Soc. **71**(1), pp. 25s-35s (1992)
J. H. Selverian, S. Kang. GTE Laboratories, Inc., Waltham, Mass.
- 369 The Role of Ion Species on the Adhesion Enhancement of Ion Beam Mixed $\text{Fe}/\text{Al}_2\text{O}_3$ Systems**
Proceedings of the Fall Meeting of the Materials Research Society, Boston, December 2-6, 1991 **238**, pp. 793-98 (Pittsburgh, Pa.: Materials Research Society, 1992)
J. E. Pawel, C. J. McHargue, L. J. Romana, L. L. Horton, J. J. Wert. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 370 Ion Beam Enhanced Adhesion of Iron Films to Sapphire Substrates**
Surf. Coatings Technol. **51**, pp. 129-32 (1992)
J. E. Pawel, C. J. McHargue, L. J. Romana, J. J. Wert. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 371 Study and Analysis of the Stress State in a Ceramic, Button-Head, Tensile Specimen**
ORNL/TM-11767 (September 1991)
M. G. Jenkins, M. K. Ferber, R. L. Martin, V. T. Jenkins, V. J. Tennery. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 372 Report on the Planning Workshop on Cost-Effective Ceramic Machining**
ORNL/M-1745 (November 1991)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 373 Ceramic Technology for Advanced Heat Engines Project Semiannual Progress Report for October 1990 Through March 1991**
ORNL/TM-11859 (July 1991)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 374 Gelcasting—A New Ceramic Forming Process**
Am. Ceram. Soc. Bull. 70(1), pp. 1641–49 (1991)
O. O. Omatete, M. A. Janney, R. A. Strehlow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 375 High Temperature Degradation of Structural Composites**
Ceram. Int. 17, pp. 243–52 (1991)
S. M. Wiederhorn, B. J. Hockey. National Institute of Standards and Technology, Gaithersburg, Md.
- 376 Microstructural Characterization of Creep-Deformed SiC Whisker-Reinforced Si₃N₄ Composite**
Ultramicroscopy 37, p. 263 (1991)
K. L. More. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. A. Koester, R. F. Davis. North Carolina State University, Raleigh, N. C.
- 377 Deformation and Microstructural Changes in SiC Whisker-Reinforced Si₃N₄ Composites**
J. Mater. Res. 6(12), p. 2735 (1991)
D. A. Koester, R. F. Davis. North Carolina State University, Raleigh, N. C.
K. L. More. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 378 Defect Characterization in a CVD α Si₃N₄**
Proceedings of the 49th Annual Meeting of the Electron Microscopy Society of America, ed. G. W. Bailey, pp. 936–37 (San Francisco: San Francisco Press, 1991)
K. L. More. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 379 Ceramic Technology for Advanced Heat Engines Project Semiannual Progress Report for April 1990 Through September 1990**
ORNL/TM-11719 (December 1990)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 380 Ceramic Technology for Advanced Heat Engines Project Database: September 1989 Summary Report**
ORNL/M-1286 (October 1990)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 381 Mechanical Behavior of a SiC-Fiber/Si₃N₄ Composite**
MTL TN 90-2* (September 1990)
J. J. Swab, G. D. Quinn, D. J. Snoha. U.S. Army Materials Technology Laboratory, Watertown, Mass.

* Available from the U.S. Army Materials Technology Laboratory, Watertown, Mass. 02172-0001.

- 382 The Evaluation of Environmental Effects in Toughened Ceramics for Advanced Heat Engines Investigation of Selected SiC and Si₃N₄ Ceramics**
ORNL/Sub/84-00221/2 (August 1990)
N. L. Hecht, G. A. Graves, D. E. McCullum, A. P. Berens, S. Goodrich, J. D. Wolf, J. R. Hoenigman, P. Yaney, D. Grant, S. Hilton. University of Dayton Research Center, Dayton, Ohio
- 383 Synthesis of High Purity Sinterable Si₃N₄ Powders**
ORNL/Sub/85-SB012/1 (August 1990)
G. M. Crosbie, R. L. Predmesky, J. M. Nicholson. Ford Motor Co., Dearborn, Mich.
- 384 Ceramic Technology for Advanced Heat Engines Project. Semiannual Progress Report for April 1989 Through September 1989**
ORNL/TM-11489 (August 1990)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 385 Influence of Diesel Engine Exposure on the Rupture Strength of Silicon Nitride and Partially Stabilized Zirconia**
ORNL-6612 (June 1990)
C. R. Brinkman, G. M. Begun, R. L. Graves, W. K. Kahl, K. C. Liu, B. H. West. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 386 Effect of Environment upon Mechanical Behavior of Structural Ceramics for Application in the DOE Ceramic Technology for Advanced Heat Engines Project. Final Report, January 1985 December 1986**
ORNL/Sub/84-00221/1 (June 1990)
N. L. Hecht, G. A. Graves, D. E. McCullum, A. P. Berens, S. Goodrich, J. D. Wolf, J. R. Hoenigman, P. Yaney, D. Grant, S. Hilton, S. D. Jang. University of Dayton Research Institute, Dayton, Ohio
- 387 Analytical and Experimental Evaluation of Joining Silicon Nitride to Metal and Silicon Carbide to Metal for Advanced Heat Engine Applications. Final Report Phase I**
ORNL/Sub/87-SB047C/1 (April 1990)
S. Kang, J. H. Selverian, H. Kim, D. O'Neil. GTE Laboratories, Inc., Waltham, Mass.
K. Kim. Brown University, Providence, R.I.
- 388 Ceramic Technology for Advanced Heat Engines Project Data Base: March 1989 Summary Report**
ORNL/M-1098 (April 1990)
B. L. P. Keyes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 389 Development of Wear-Resistant Ceramic Coatings for Diesel Engine Components**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 131-41 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
M. G. S. Naylor, M. P. Fear. Cummins Engine Company, Inc., Columbus, Ind.
- 390 Wear-Resistant Ceramic Coatings for Diesel Engine Components**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 143-48 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
M. H. Haselkorn, F. A. Kelley, C. D. Weiss. Caterpillar, Inc., Peoria, Ill.

- 391 Studies of Dynamic Contact of Ceramics and Alloys for Advanced Heat Engines**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 149–53 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
P. A. Gaydos, K. F. Dufrane. Battelle Columbus Laboratories, Columbus, Ohio
- 392 Identification and Development of Optimum Silicon Carbide Whiskers for Silicon Nitride Matrix Composites**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 167–72 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
T. N. Tiegs, L. F. Allard, P. F. Becher, M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 393 Synthesis of High-Purity Sinterable Silicon Nitride Powder**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 191–96 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
G. M. Crosbie, R. L. Predmesky, J. M. Nicholson. Ford Motor Co., Dearborn, Mich.
- 394 Advanced Processing of High-Performance Silicon Nitride Ceramics**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 197–206 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
A. E. Pasto, S. Natansohn. GTE Laboratories, Inc., Waltham, Mass.
- 395 Material Development in the Silicon Nitride–Silicon Carbide Whisker System**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 207–13 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
N. D. Corbin, K. N. Siebein, J. S. Hansen, G. J. Sundberg, V. K. Pujari, G. A. Rossi. Norton Co., Northboro, Mass.
- 396 Mechanical Properties Characterization of High Performance Ceramics**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 217–33 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
N. L. Hecht, D. E. McCullum, S. Goodrich, L. Chuck. University of Dayton Research Institute, Dayton, Ohio
- 397 High Temperature Tensile and Fatigue Strengths of Silicon Nitride**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 235–44 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
K. C. Liu, C. R. Brinkman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 398 Numerical and Empirical Verification of the Stress State in a Ceramic, Button-head, Tensile Specimen**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 245–50 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
M. G. Jenkins, M. K. Ferber, R. L. Martin, V. J. Tennery. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 399 Tensile Creep of SiC Whisker Reinforced Silicon Nitride**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 251-64 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
B. J. Hockey, S. M. Wiederhorn, W. Liu. National Institute of Standards and Technology, Gaithersburg, Md.
J. G. Baldoni, S.-T. Buljan. GTE Laboratories, Inc., Waltham, Mass.
- 400 Fracture Strength Analysis of Silicon Nitride and Silicon Carbide Ceramics from an International Cooperative Research Program**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 265-73 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
V. J. Tennery, M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 401 Life Prediction Methodology for Ceramic Components of Advanced Heat Engines**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 275-82 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
A. M. Comfort, J. S. Cuccio. AlliedSignal, Inc., Phoenix, Ariz.
- 402 Low Temperature Degradation of Y-TZP Materials**
MTL TR 90-4* (January 1990)
J. J. Swab. U.S. Army Materials Technology Laboratory, Watertown, Mass.
- 403 Performance of Y-TZP Materials Between 800°C and 1200°C**
MTL TR 90-3* (January 1990)
J. J. Swab. U.S. Army Materials Technology Laboratory, Watertown, Mass.
- 404 Elevated-Temperature-Delayed Failure of Alumina Reinforced With 20 Vol % Silicon Carbide Whiskers**
J. Mater. Sci. **73**, pp. 91-96 (1990)
P. F. Becher, P. Angelini, W. H. Warwick, T. N. Tiegs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 405 A New Method for Analyzing Data from Continuous Depth-Sensing Microindentation Tests**
J. Mater. Res. **5**, pp. 123-26 (1990)
D. L. Joslin. University of Tennessee, Knoxville, Tenn.
W. C. Oliver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 406 Thermal Diffusivity/Conductivity of Alumina-Silicon Carbide**
J. Am. Ceram. Soc. **73**, pp. 461-64 (1990)
P. H. McCluskey. Alfred University, Alfred, N.Y.
R. K. Williams, R. S. Graves, T. N. Tiegs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 407 Effect of Aspect Ratio and Liquid Phase Content on Densification of Alumina-SiC Whisker Composites**
J. Am. Ceram. Soc. **73**(5), pp. 1440-42 (1990)
T. N. Tiegs. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. M. Dillard. Georgia Institute of Technology, Atlanta, Ga.

* Available from the U.S. Army Materials Technology Laboratory, Watertown, Mass. 02172-0001.

- 408 Creep Behavior of an SiC-Whisker-Reinforced Alumina**
J. Am. Ceram. Soc. 73, pp. 1378-81 (1990)
H. T. Lin, P. F. Becher. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 409 The Role of Interfaces in the Creep-Deformation of an SiC Whisker-Reinforced Si_3N_4 Composite**
Proceedings of the Twelfth International Congress for Electron Microscopy, Seattle, August 12-18, 1990, pp. 382-83 (San Francisco: San Francisco Press, Inc., 1990)
K. L. More. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. A. Koester, R. F. Davis. North Carolina State University, Raleigh, N.C.
- 410 Synthesis of High Purity Sinterable Silicon Carbide Powder**
ORNL/Sub/84-00214/1 (November 1989)
W. D. Boecker, B. L. Mehosky, R. S. C. Rogers, R. S. Storm, V. Venkateswaran. The Carborundum Company, Structural Ceramics Division, Niagara Falls, N.Y.
- 411 Ceramic Technology for Advanced Heat Engines Project Semiannual Progress Report for October 1988 Through March 1989**
ORNL/TM-11239 (August 1989)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 412 IEA/Annex II Powder Characterization Cooperative Program**
MTL TR 89-53* (June 1989)
T. M. Resetar, J. W. McCauley. U.S. Army Materials Technology Laboratory, Watertown, Mass.
G. E. Schaefer. W. R. Grace Company, Cambridge, Mass.
A. L. Dragoo, S. M. Hsu. National Institute of Standards and Technology, Gaithersburg, Md.
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
H. Hausner. Technical University of Berlin, Berlin, FRG
R. Pompe. Swedish Institute for Silicate Research, Göteborg, Sweden
- 413 Life Prediction Methodology for Ceramic Components**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 257-62 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
D. L. Vaccari, P. K. Khandelwal. Allison Gas Turbine Div., General Motors Corp., Indianapolis, Ind.
- 414 Development of Silicon Carbide Whisker Reinforced Silicon Nitride Formed by Slip Casting**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 251-55 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
H. C. Yeh. Garrett Ceramic Components Division, Torrance, Calif.
J. L. Schienle. Garrett Auxiliary Power Div., Phoenix, Ariz.
K. R. Karasek, S. A. Bradley. AlliedSignal, Inc., Des Plaines, Ill.
- 415 Silicon Carbide Whisker Reinforced Silicon Nitride**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 243-50 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
M. L. Huckabee, J. G. Baldoni, J. T. Neil, G. Zilberstein, S.-T. Buljan. GTE Laboratories, Inc., Waltham, Mass.

* Available from the U.S. Army Materials Technology Laboratory, Watertown, Mass. 02172-0001.

- 416 Material Development in the Silicon Nitride-Silicon Carbide Whisker System**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 235-41
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
N. D. Corbin, C. A. Willkens, J. L. Hammarstrom, V. K. Pujari, G. A. Rossi, K. N. Siebein.
Norton Co., Northboro, Mass.
J. S. Hansen, C. L. Chang. Norton Co., Salt Lake City, Utah
- 417 Development of Improved Processing and Evaluation of Silicon Nitride**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 227-34
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
V. K. Pujari, K. E. Amin, P. H. Tewari, S. D. Hartline. Norton Co., Northboro, Mass.
- 418 Ceramic Coatings to Reduce Contact Stress Damage of Ceramics Performance Testing**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 221-26
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
D. W. Oblas, C. D'Angelo, H. E. Rebenne, V. K. Sarin. GTE Laboratories, Inc., Waltham, Mass.
- 419 Dynamic Contact of Ceramics in Ring-Cylinder Applications**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 145-48
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
K. F. Dufrane, P. A. Gaydos. Battelle Columbus Div., Columbus, Ohio
- 420 Wear Resistant Ceramic Coatings for Diesel Engine Components**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 119-22
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
M. Haselkorn, F. Kelley, D. Weiss. Caterpillar, Inc., Peoria, Ill.
- 421 Development of Magnetic Resonance Imaging Technology for Imaging Binder Distribution in Ceramics**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 211-17
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
W. A. Ellingson, P. S. Wong. Argonne National Laboratory, Argonne, Ill.
J. L. Ackerman. Massachusetts General Hospital, Boston, Mass.
H. C. Yeh, J. P. Pollinger. AlliedSignal, Inc., Torrance, Calif.
- 422 Confidence Bounds on Strength Estimates**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 205-10
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
W. T. Tucker, C. A. Johnson. GE Corporate R&D, Schenectady, N.Y.
- 423 Synthesis and Characterization of Ultra-Low Thermal Expansion Oxide Ceramics**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 187-204
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
R. E. Swanson, J. J. Brown. Virginia Polytechnic Institute and State University, Blacksburg, Va.

- 424 Strength and Fatigue of Silicon Nitride in Uniaxial Tension**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 173-86
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
J. Sankar, A. Kelkar, A. Sinha. North Carolina A&T State University, Greensboro, N.C.
K. C. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 425 Analytical and Experimental Evaluation of Joining Silicon Nitride to Metal and Silicon Carbide to Metal**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 165-71
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
E. M. Dunn, S. Kang. GTE Laboratories, Inc., Waltham, Mass.
H. Mizuhara. Wesgo Div., GTE Products Corp., Belmont, Calif.
K. S. Kim. University of Illinois, Urbana, Ill.
- 426 Analytical and Experimental Evaluation of Joining Silicon Carbide to Silicon Carbide and Silicon Nitride to Silicon Nitride for Advanced Heat Engine Applications**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 157-63
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
G. A. Rossi, D. O. Patten, G. J. Sundberg, C. H. Bates, F. J. Wu. Norton Co., Northboro, Mass.
- 427 Joining of Zirconia Ceramics with a $\text{CaO-TiO}_2\text{-SiO}_2$ Interlayer**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 149-54
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
S. L. Swartz, B. S. Majumdar, B. C. Mutsuddy. Battelle Columbus Div., Columbus, Ohio
- 428 Zirconia Toughened Ceramics for Heat Engine Applications Phase IIA**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 133-44
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
E. Lilley, G. A. Rossi. Norton Co., Northboro, Mass.
- 429 Influence of Diesel Engine Combustion on the Rupture Strength of Partially Stabilized Zirconia**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 123-31
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
C. R. Brinkman, G. M. Begun, O. B. Cavin, B. E. Foster, R. L. Graves, W. K. Kahl, K. C. Liu, W. A. Simpson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 430 Development of Wear-Resistant Ceramic Coatings for Advanced Diesel Engines**
Proceedings of the 26th Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Michigan, October 24-27, 1988, pp. 111-18
(Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1989)
M. G. S. Naylor, M. P. Fear. Cummins Engine Co., Inc., Columbus, Ind.
- 431 Ceramic Technology for Advanced Heat Engines Project Semiannual Progress Report for April Through September 1988**
ORNL/TM-11116 (March 1989)
D. R. Johnson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 432 Properties of Yttria-Tetragonal Zirconia Polycrystal (Y-TZP) Materials After Long-Term Exposure to Elevated Temperatures**
MTL TR 89-21* (March 1989)
J. J. Swab. U.S. Army Materials Technology Laboratory, Watertown, Mass.
- 433 Ceramic Technology for Advanced Heat Engines Project Data Base: September 1988 Summary Report**
ORNL/M-755 (March 1989)
B. L. P. Booker. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 434 Thin Film and Near Surface Characterization Using Indentation Systems**
Proceedings NATO Advanced Study Institute on Structure-Property Relationships in Surface-Modified Ceramics, Ciocco, Italy, August 28–September 9, 1988, pp. 295–302 (Boston; Dordrecht, The Netherlands: Kluwer Academic Publishers, 1989)
D. L. Joslin. University of Tennessee, Knoxville, Tenn.
C. J. McHargue, W. C. Oliver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 435 Exploratory High-Temperature Tensile and Cyclic Fatigue Characterization of Commercial MgO-PSZ**
Proceedings Third International Symposium on Ceramic Materials and Components, Las Vegas, November 27–30, 1988, pp. 841–55 (Westerville, Ohio: American Ceramic Society, 1989)
K. C. Liu, C. R. Brinkman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 436 Pre-Pilot Synthesis of Low Carbon Si_3N_4**
Proceedings Second International Conference on Ceramic Powder Processing Science, Berchtesgaden, FRG, October 12–14, 1988, pp. 269–73 (Bad Honnef: Deutsche Keramische Gesellschaft, 1989)
G. M. Crosbie, J. M. Nicholson, R. L. Predmesky, E. D. Stiles. Ford Motor Company, Dearborn, Mich.
- 437 Laser Diffraction Methods for High Temperature Strain Measurements**
Proceedings Spring Conference on Experimental Mechanics, Cambridge, Mass., May 28–June 2, 1989, pp. 87–93 (Society of Experimental Mechanics, 1989)
H. Pih. University of Tennessee, Knoxville, Tenn.
K. C. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 438 Theoretical and Experimental Analysis of the Toughening Behavior of Whisker Reinforcement in Ceramic Matrix Composites**
Mater. Sci. Eng. A107, pp. 257–59 (1989)
P. F. Becher, C. H. Hsueh, P. Angelini, T. N. Tiegs. Oak Ridge National Laboratory, Oak Ridge, Tenn.

* Available from the U.S. Army Materials Technology Laboratory, Watertown, Mass. 02172-0001.

ALTERNATIVE FUELS AND PROPULSION TECHNOLOGY

- 439 Controlling Chaos in Spark-Ignition Engines**
Proceedings Central and Eastern States Sections Joint Technical Meeting of the Combustion Institute, New Orleans, March 15-17, 1993, pp. 675-79 (The Combustion Institute, 1993)
R. M. Wagner. University of Missouri-Rolla, Rolla, Mo.
C. S. Daw, J. F. Thomas. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 440 Federal Methanol Fleet Project. Final Report**
ORNL/TM-12278 (March 1993)
B. H. West, R. N. McGill, S. L. Hillis. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. W. Hodgson. University of Tennessee, Knoxville, Tenn.
- 441 Heat Transfer Effectiveness of a Thermal Barrier Coating with Different Fuel Compositions**
ORNL/TM-11816 (June 1991)
N. Domingo. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 442 Results from the Third Year of Operation of the Federal Methanol Fleet at Argonne National Laboratory**
ORNL/TM-11736 (January 1991)
B. H. West, R. N. McGill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Hillis, J. W. Hodgson. University of Tennessee, Knoxville, Tenn.
- 443 Neat Methanol Combustion in a DI Diesel Engine Using Catalytically Coated Glow Plugs**
Alternative Liquid Fuels in Transportation, pp. 97-105, proceedings of the International Fuels and Lubricants Meeting and Exposition, Toronto, Ontario, Canada, October 7-10, 1991, SAE Special Publication 889 (Warrendale, Pa.: Society of Automotive Engineers, 1991)
W. Mitchell, T. A. Litzinger, D. A. Santavicca. The Pennsylvania State University, University Park, Pa.
- 444 High-Alcohol Microemulsion Fuel Performance in a Diesel Engine**
SAE* Paper 902101, presented at the 1990 SAE International Fuels and Lubricants Meeting and Exposition, October 22-25, 1990, Tulsa, Oklahoma
B. H. West, A. L. Compere, W. L. Griffith. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 445 Interpretation of Engine Cycle-to-Cycle Variation by Chaotic Time Series Analysis**
SAE Paper 902103, presented at the 1990 SAE International Fuels and Lubricants Meeting and Exposition, October 22-25, 1990, Tulsa, Oklahoma
C. S. Daw, W. K. Kahl. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 446 Results from the Second Year of Operation of the Federal Methanol Fleet at Oak Ridge National Laboratory**
ORNL/TM-11622 (September 1990)
B. H. West, R. N. McGill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Hillis. University of Tennessee, Knoxville, Tenn.

*SAE papers are available from the Society of Automotive Engineers International, 400 Commonwealth Drive, Warrendale PA 15096-0001.

- 447 Results from the Fourth Year of Operation of the Federal Methanol Fleet at Lawrence Berkeley Laboratory**
ORNL/TM-11590 (August 1990)
B. H. West, R. N. McGill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Hillis. University of Tennessee, Knoxville, Tenn.
- 448 Heavy Duty Liquid and Gaseous Fuel Emissions Database Test Results from Four Alternative Fuel Configurations of the Caterpillar 3406 Engine**
ORNL/Sub/86-SB195/1 (June 1990)
D. J. Waldman. Caterpillar, Inc., Technical Center, Peoria, Ill.
- 449 Federal Methanol Fleet Update**
Proceedings Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Mich., October 23-26, 1989 P-230, pp. 11-15 (Warrendale, Pa.: Society of Automotive Engineers, April 1990)
R. N. McGill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 450 Alternative Fuels R&D Needs Program Directions**
Proceedings Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Mich., October 23-26, 1989 P-230, pp. 7-9 (Warrendale, Pa.: Society of Automotive Engineers, April 1990)
R. L. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 451 Ignition Enhancement of the DDC Methanol Engine**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 23-28 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
P. M. Laing, R. E. Winsor. Detroit Diesel Corp., Detroit, Mich.
- 452 Heavy Duty Liquid and Gaseous Fuel Database Test Results from Four Alternative Configurations of the Caterpillar 3406 Engine**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 29-41 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
D. J. Waldman. Caterpillar, Inc., Peoria, Ill.
- 453 Photographic Visualization of the Ignition of Methanol in a Compression Ignition Engine**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 17-22 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
D. L. Abata. Michigan Technological University, Houghton, Mich.
- 454 Performance Comparisons of Insulated and Non-Insulated Diesel Engines**
Proceedings of the Twenty-Seventh Automotive Technology Development Contractors' Coordination Meeting P-230, pp. 75-80 (Warrendale, Pa.: Society of Automotive Engineers, Inc., April 1990)
W. K. Cheng, V. W. Wong, F. Gao. Massachusetts Institute of Technology, Cambridge, Mass.
- 455 Experimental Heat Transfer Efforts with Thermal Barrier Materials at ORNL**
Proc. Workshop on Coatings for Advanced Heat Engines, Castine, Maine, August 5-9, 1990, pp. IV-53-IV-60 (Washington, D.C.: Department of Energy, 1990)
N. Domingo, M. R. Cates. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 456 Low-Heat-Rejection Engine Research Status: Where Do We Go From Here?**
SAE Paper 900621, presented at the 1990 SAE International Congress and Exposition, February 26–March 2, 1990, Detroit, Michigan
C. S. Reddy. Union College, Schenectady, N.Y.
N. Domingo, R. L. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 457 Chemical Effect of Fuel Composition Changes on Emissions from a DI Diesel Engine. Final Report**
ORNL/Sub/86-SB020/1 (December 1989)
T. A. Litzinger. The Pennsylvania State University, University Park, Pa.
- 458 Abnormal Combustion in a Methanol Fueled Engine**
SAE paper no. 892162, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
M. R. Swain, J. A. Blanco, M. N. Swain. University of Miami, Coral Gables, Fla.
- 459 Effects of Fuel/Air Mixture Preparation on Fuel Nitrogen Conversion in a Spark Ignition Engine**
SAE paper no. 892161, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
J. W. Hodgson. University of Tennessee, Knoxville, Tenn.
R. N. McGill. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 460 The Effect of Hydro Treatment of Coal-Derived Synthetic Fuels on DI Diesel Emissions and Performance**
SAE paper no. 892132, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
J. H. Palumbo, T. A. Litzinger. Pennsylvania State University, University Park, Pa.
- 461 Hydroprocessing of Direct Coal Liquefaction Product for Diesel Engine Fuel**
SAE paper no. 892131, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
N. R. Sefer, J. Erwin. Southwest Research Institute, San Antonio, Texas
- 462 The Effect of Aromatics and Cycloparaffins on DI Diesel Emissions**
SAE paper no. 892130, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
C. T. Flanigan, T. A. Litzinger. Pennsylvania State University, University Park, Pa.
R. L. Graves. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 463 Thermal Barrier Effects on Performance and Emissions of a Methanol Fueled DI Engine**
SAE paper no. 892163, presented at the 1989 SAE International Fuels and Lubricants Meeting and Exposition, September 1989, Baltimore, Md.
W. K. Kahl. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 464 Results from the Second Year of Operation of the Federal Methanol Fleet at Argonne National Laboratory**
ORNL/TM-11230 (August 1989)
R. N. McGill, B. H. West. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Hillis, J. W. Hodgson. University of Tennessee, Knoxville, Tenn.

- 465 *Results from the First Year of Operation of the Federal Methanol Fleet at Oak Ridge National Laboratory***
ORNL/TM-11229 (July 1989)
R. N. McGill, B. H. West. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Hillis, J. W. Hodgson. University of Tennessee, Knoxville, Tenn.
- 466 *Fuel Nitrogen Conversion in a Spark Ignition Engine Part II: Effects of Fuel/Air Mixture Preparation***
ORNL/Sub/87-07685/1 (February 1989)
J. W. Hodgson. University of Tennessee, Knoxville, Tenn.
- 467 *Analysis of the Combustion of Four Alternate Fuels in a Diesel Engine Using High Speed Photography. Final Report***
ORNL/Sub/87-91333/1 (February 1989)
D. L. Abata, D. Masterson. Michigan Technological University, Houghton, Mich.
- 468 *Evaluation of the Effects of Natural Gas Contaminants on Corrosion in Compressed Natural Gas Storage Systems—Phase II***
ORNL/Sub/85-22025/1 (January 1989)
F. F. Lyle, Jr. Southwest Research Institute, San Antonio, Texas

MICROEMULSION FUELS

- 469 Correlating Microemulsion Fuel Composition, Structure, and Combustion Properties**
ORNL/TM-11248 (September 1989)
W. L. Griffith, A. L. Compere. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 470 Small Angle Scattering From Micelles of Potassium Salts of 18-Carbon Fatty Acids**
Langmuir 5, pp. 1191-95 (1989)
J. S. Johnson, Jr., W. L. Griffith, A. L. Compere. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 471 Effect of Composition on Sizes of W/O Ethanolamine-Oleic Acid Microemulsions by Small-Angle Neutron Scattering**
Langmuir 5(2), pp. 357-63 (1989)
E. Caponetti, R. Triolo, A. Lizzio. Istituto Chimica Fisica, University of Palermo, Palermo, Italy
W. L. Griffith, J. S. Johnson, Jr., A. L. Compere. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 472 Analysis of Small-Angle Scattering Patterns from Precipitating Alloys**
Physical Review B 39(7), pp. 4588-94 (1989)
R. Triolo, E. C. Caponetti. Istituto Chimica Fisica, University of Palermo, Palermo, Italy
S. Spooner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 473 Opportunities for Improved Energy Recovery in Pulp Mills**
Alternative Energy Sources VIII. Proceedings of the Eighth Miami International Conference, Miami, Fla., December 14-16, 1987, 2, pp. 755-68 (Washington, D.C.: Hemisphere Press, 1989)
A. L. Compere, W. L. Griffith. Oak Ridge National Laboratory, Oak Ridge, Tenn.
T. W. Joyce. North Carolina State University, Raleigh, N.C.

INDUSTRIAL CHEMICAL HEAT PUMPS

- 474 *Materials Corrosion in Ammonia/Solid Heat Pump in Working Media***
ORNL/TM-12004 (January 1992)
D F. Wilson, M. Howell, J. H. DeVan. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 475 *Methods for Predicting Properties and Tailoring Salt Solutions for Industrial Processes***
Technology 2002: Conference Proceedings, The Third National Technology Transfer Conference and Exposition, December 1-3, 1992, NASA-CP-3189 (Washington, D.C.: National Aeronautics and Space Administration, 1992)
M. R. Ally. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 476 *Refractive Indexes of Aqueous LiBr Solutions***
J. Chem. Eng. Data **37**, pp. 110-13 (1992)
A. Zaltash, M. R. Ally. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 477 *Validation of a PC Based Program for Single Stage Absorption Heat Pump***
ORNL/TM-11923 (September 1991)
A Zaltash, M. R. Ally. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 478 *Effect of Additives on the Film Heat Transfer Coefficients of (Li,K,Na)NO₃ and LiBr Aqueous Mixtures***
Proceedings of the XVIII International Congress of Refrigeration, Montreal, Quebec, August 10-15, 1991, paper no. 52 (Paris: International Institute of Refrigeration, 1991)
A. Zaltash, M. R. Ally, R. L. Linkous, R. H. Reiner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 479 *Densities and Refractive Indexes of Aqueous (Li,K,Na)NO₃ Mixtures***
J. Chem. Eng. Data **36**, pp. 209-13 (1991)
M. R. Ally, L. N. Klatt, A. Zaltash, R. L. Linkous. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 480 *Measurements of Heat and Mass Transfer Coefficients During Absorption of Water Vapor by Lithium Bromide and (Li,K,Na)NO₃ Mixtures***
Heat Pump Design, Analysis, and Application AES 26, pp. 83-90 (New York: American Society of Mechanical Engineers, 1991)
A. Zaltash, M. R. Ally, R. L. Linkous, L. N. Klatt. Oak Ridge National Laboratory, Oak Ridge, Tenn.

MATERIALS FOR ADVANCED INDUSTRIAL HEAT EXCHANGERS

- 481 *Product Technology and Market Assessment of Silicon Carbide Whisker Reinforced Alumina Heat-Exchanger Tubes***
ORNL/Sub/86-SE793C/1 (October 1993)
R. O. Loutfy, J. C. Withers, D. Chakravarti. Materials and Electrochemical Research Corporation, Tucson, Ariz.
- 482 *Fabrication of Whisker-Toughened Alumina Tubes***
ORNL/Sub/86-SE793C (September 1993)
R. O. Loutfy. Materials and Electrochemical Research Corporation, Tucson, Ariz.
- 483 *High-Temperature Corrosion of Ceramic-Ceramic Composites in a Waste Incinerator Environment***
ORNL/TM-12212 (January 1993)
J. R. Keiser, J. I. Federer, T. J. Henson, D. L. Hindman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 484 *Development of a Zirconia-Mullite Based Ceramic for Recuperator Applications***
ORNL/Sub/86-22044/2 (December 1992)
J. M. Gonzalez, GTE Products Corp., Towanda, Pa.
- 485 *Rheology of Zirconia-Alumina Gelcasting Slurries***
Proceedings of the Spring Meeting, Materials Research Society, San Francisco, April 27-May 1, 1992, 271, pp. 269-75 (Pittsburgh: Materials Research Society, 1992)
A. Bleier, O. O. Omatete, C. G. Westmoreland. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 486 *Corrosion of SiC and Oxide-Composite Ceramics by a Simulated Steam-Reformer Atmosphere***
ORNL/TM-11828 (September 1991)
J. I. Federer, H. E. Kim, A. J. Moorhead. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 487 *Corrosion Behavior of Continuous-Filament-Wound Ceramic Composite Tubes***
ORNL/TM-11691 (May 1991)
J. I. Federer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 488 *Gelcast Reaction-Bonded Silicon Nitride Composites***
Ceramic Engineering and Science Proceedings 12, proceedings of the 15th Annual Conference on Composites and Advanced Ceramic Materials, Cocoa Beach, Fla., January 13-16, 1991 (Westerville, Ohio: American Ceramic Society, 1991)
O. O. Omatete, T. N. Tiegs, A. C. Young. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 489 *Construction and Testing of a Flue-Gas Corrosion Probe***
ORNL-6630 (August 1990)
J. I. Federer, J. A. McEvers. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 490 *Design Methodology Needs for Fiber-Reinforced Ceramic Heat Exchangers***
ORNL/TM-11012 (August 1990)
J. J. Blass, M. B. Ruggles. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 491 Industrial Operating Experience of the GTE Ceramic Recuperator**
ORNL/Sub/86-22044 (June 1990)
J. M. Gonzalez, J. L. Ferri. GTE Products Corp., Towanda, Pa.
W. J. Rebello. PAR Enterprises, Inc., Fairfax, Va.
- 492 Alumina-Base Coatings for Protection of SiC Ceramics**
J Mater. Eng. **12**, pp. 141-49 (1990)
J. I. Federer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 493 High-Temperature Corrosion of Heat Exchanger Materials**
Ceramics Transactions **10**, pp. 425-43 (1990)
J. I. Federer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 494 Selection of Corrosion Resistant Materials For Use In Molten Nitrate Salts**
ORNL/TM-11162 (October 1989)
P. F. Tortorelli, P. S. Bishop, J. R. DiStefano. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 495 Extrusion of Alumina-Silicon Carbide Whisker Composites**
ORNL/TM-10373 (October 1989)
M. A. Janney, E. S. Bomar, M. C. Vance. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 496 High-Temperature Corrosion of Metallic Alloys in an Oxidizing Atmosphere Containing NaCl**
ORNL/TM-11029 (February 1989)
J. I. Federer. Oak Ridge National Laboratory, Oak Ridge, Tenn.

ADVANCED INDUSTRIAL MATERIALS

- 497 **Effects of Electronic and Recoil Processes in Polymers During Ion Implantation**
J. Mater. Res. 9(4), p. 1043 (April 1994)
 E. H. Lee, G. R. Rao, M. B. Lewis, L. K. Mansur. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 498 **Solid Solution Limits and Selected Mechanical Properties of the Quaternary Li_2 Trialuminide Al-Ti-Mn-Mo**
Scr. Metall. 30(8), p. 997 (April 15, 1994)
 J. H. Schneibel. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 499 **Characterization, Processing and Alloy Design of NiAl-Based Shape Memory Alloys**
Mater. Charact. 32(3), p. 139 (April 1994)
 E. P. George, C. T. Liu, J. A. Horton, C. J. Sparks. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 M. Kao. Johnson Control, Inc., Milwaukee, Wis.
 H. Kunsmann, T. King. Eaton Corporation, Milwaukee, Wis.

- 500 **Site Occupation of Iron in Intermetallic NiAl**
Appl. Surf. Sci. 76/77, p. 155 (March 1994)
 A. J. Duncan, M. J. Kaufman. University of Florida, Gainesville, Fla.
 C. T. Liu, M. K. Miller. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 501 **Segregation of Interstitial Impurities in Single Crystal NiAl**
Appl. Surf. Sci. 76/77, p. 160 (March 1994)
 A. J. Duncan, M. J. Kaufman. University of Florida, Gainesville, Fla.
 M. K. Miller. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 502 **Effects of Alloying Additions on the Microstructures, Mechanical Properties and Weldability of Fe_3Al -Based Alloys**
Mater. Sci. Eng. 174(1), p. 59 (January 1994)
 C. G. McKeamey, P. J. Maziasz, G. M. Goodwin, T. Zacharia. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 503 **Homogeneous Reaction Rate Model for Hydrogen Production from Ion-Irradiated Polymers**
J. Nucl. Mater. 208, pp. 61-72 (1994)
 M. B. Lewis, E. H. Lee, L. K. Mansur. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 W. A. Coghlan. Grand Canyon University, Phoenix, Ariz.

- 504 **Raman Scattering from Ion Implanted Diamond, Graphite and Polymers**
Phys. Rev. B 48(21), pp. 15540-51 (December 1, 1993)
 E. H. Lee, L. K. Mansur. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 D. M. Hembree, Jr. Oak Ridge Y-12 Plant, Oak Ridge, Tenn.
 G. R. Rao. Auburn University, Auburn, Ala.

- 505 **2 to 18 GHz Broadband Microwave Heating Systems**
Microwave Journal 36(11), p. 24 (November 1993)
 R. J. Lauf, D. W. Bible. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 A. C. Johnson, C. A. Everleigh. Microwave Labs, Inc., Raleigh, N. C.

- 506 Thermal Expansion Data on Several Iron- and Nickel-Aluminide Alloys**
Scr. Metall. et Mater. **29**(8), p. 1043-48 (October 15, 1993)
W. D. Porter, P. J. Maziasz. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 507 G-Values for Gas Production from Ion-Irradiated Polystyrene**
J. Nucl. Mater. **203**(3), p. 224 (September 1993)
M. B. Lewis, E. H. Lee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 508 Weld Solidification Cracking in Cast Ni₃Al Alloys**
Scr. Metall. et Mater. **28**(11), pp. 1305-10 (June 1, 1993)
M. L. Santella. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 509 Alloying Effects on Mechanical and Metallurgical Properties of NiAl**
ORNL/TM-12200 (June 1993)
S. L. Lee, J. A. Horton, E. H. Lee, E. P. George. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 510 Ordered Intermetallic Alloys. Part II: Silicides, Trialuminides, and Others**
JOM **45**(6), p. 28 (June 1993)
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. S. Kumar. Martin Marietta Laboratories, Baltimore, Md.
- 511 Ordered Intermetallic Alloys. Part I: Nickel and Iron Aluminides**
JOM **45**(5), p. 38 (May 1993)
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. S. Kumar. Martin Marietta Laboratories, Baltimore, Md.
- 512 Electrical Resistivity of Ni_{0.8}Mo_{0.2}: Explanation of Anomalous Behavior in Short-Range Ordered Alloys**
Phys. Rev. Lett. **70**(21), pp. 3311-14 (May 24, 1993)
D. M. C. Nicholson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. H. Brown. Luther College, Decorah, Iowa
- 513 Microstructural Effects on Surface Mechanical Properties of Ion Implanted Polymers**
J. Mater. Res. **8**(4), pp. 927-33 (April 1993)
G. R. Rao. Auburn University, Auburn, Ala.
Z. L. Wang, E. H. Lee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 514 Application of Local Selfconsistency to Alloy Phase Stability**
Bull. Am. Phys. Soc. **38**(1), p. 255 (March 1993)
D. M. C. Nicholson, G. M. Stocks, W. A. Shelton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
W. M. Temmerman, Z. Szotek. Daresbury Laboratory, Daresbury, Cheshire, United Kingdom
- 515 Alloy Development of FeAl Aluminide Alloys for Structural Use in Corrosive Environments**
ORNL/TM-12199 (February 1993)
C. T. Liu, V. K. Sikka, C. G. McCarney. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 516 Hardness Measurements of Ar⁺-Beam Treated Polyimide by Depth-Sensing Ultra Low Load Indentation**
J. Mater. Res. **8**(2), pp. 377-87 (February 1993)
E. H. Lee, W. C. Oliver, L. K. Mansur. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. Lee. Korea Academy of Industrial Technology, Seoul, Korea

- 517 Calculation of the Electronic Properties of Ni-P Amorphous Alloys**
Phys. Rev. B **47**(1), pp. 107–14 (January 1, 1993-l)
H. Yang, J. C. Swihart. Indiana University, Bloomington, Ind.
D. M. Nicholson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. H. Brown. Luther College, Decorah, Iowa
- 518 Chemical Vapor Infiltration of TiB₂ Composites**
ORNL/TM-12214 (January 1993)
T. M. Besmann, J. H. Miller, K. C. Cooley, R. A. Lowden, T. L. Starr. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 519 Ni₃ and Its Alloys**
Intermetallic Compounds: Principles and Applications, ed. J. H. Westbrook and R. L. Fleischer (Chichester; New York: Wiley, 1993)
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 520 Weld Solidification Cracking in Cast Ni₃Al Alloys**
Scr. Metall. et Mater. **28**, pp. 1305–10 (1993)
M. L. Santella. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 521 Ion Beam Application for Improved Polymer Surface Properties**
Nucl. Instrum. Methods Phys. Res. B **74**, pp. 326–30 (1993)
E. H. Lee, M. B. Lewis, L. K. Mansur. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. R. Rao. Auburn University, Auburn, Ala.
- 522 High Temperature Fracture Toughness of Ni₃Al Alloy IC-396M**
pp. 118590 in *Proceedings Fall Meeting, Materials Research Society, Boston, November 30–December 4, 1992* (Pittsburgh: Materials Research Society, 1993)
D. J. Alexander. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 523 Recent Advances in Ordered Intermetallics**
pp. 310 in *Proceedings Fall Meeting, Materials Research Society, Boston, November 30–December 4, 1992, Symposium L on High Temperature Intermetallic Alloys V, 288* (Pittsburgh: Materials Research Society, 1993)
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 524 Some Effects of Composition and Microstructure on the B₂↔D₀₃ Ordered Phase Transition in Fe₃Al Alloys**
pp. 209–15 in *Proceedings Fall Meeting, Materials Research Society, Boston, November 30–December 4, 1992, Symposium L on High Temperature Intermetallic Alloys V, 288* (Pittsburgh: Materials Research Society, 1993)
P. J. Maziasz, C. G. McKeamey, O. B. Cavin, C. R. Hubbard, T. Zacharia. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 525 Effects of Minor Alloying Elements on the Welding Behavior of FeAl Alloys for Structural and Weld-Overlay Cladding Applications**
Scr. Metall. et Mater. **27**(12), pp. 1835–40 (December 15, 1992)
P. J. Maziasz, G. M. Goodwin, C. T. Liu, S. A. David. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 526 Chemical Vapor Deposition of Refractory Metals and Ceramics II: Symposium held December 4-6, 1991, Boston, Massachusetts**
Materials Research Society Symposium Proceedings, 250 (Pittsburgh: Materials Research Society, 1992)
T. M. Besmann, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
B. M. Gallois, ed. Stevens Institute of Technology, Hoboken, N.J.
J. W. Warren, ed. Composite Innovation Corp., Woodland Hills, Calif.
- 527 Multikilowatt Variable Frequency Microwave Furnace**
Proceedings, Spring Meeting, Materials Research Society, San Francisco, April 27-May 1, 1992, 269, pp. 77-81 (Pittsburgh: Materials Research Society, 1992)
D. W. Bible, R. J. Lauf. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. A. Everleigh. Microwave Laboratories, Inc., Raleigh, N. C.
- 528 Rheology of Zirconia-Alumina Gelcasting Slurries**
Proceedings, Spring Meeting, Materials Research Society, San Francisco, April 27-May 1, 1992, 271, pp. 269-75 (Pittsburgh: Materials Research Society, 1992)
A. Bleier, O. O. Omatete, C. G. Westmoreland. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 529 Characterization of the Phase Transformations in the Shape Memory Alloy Ni-36 at% Al**
Proceedings, Fall Meeting, Materials Research Society, Boston, December 2-6, 1992 246, pp. 61-66 (Pittsburgh: Materials Research Society, 1992)
J. A. Horton, E. P. George, C. J. Sparks, O. B. Cavin. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. Y. Kao, P. Thoma. Johnson Controls, Inc., Milwaukee, Wis.
- 530 Microwave Processing of Ceramics: Guidelines Used at the Oak Ridge National Laboratory**
Proceedings, Spring Meeting, Materials Research Society, San Francisco, April 27-May 1, 1992, 269, pp. 173-85 (Pittsburgh: Materials Research Society, 1992)
M. A. Janney, H. D. Kimrey, J. O. Kiggans. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 531 Microwave Sintering of Multilayer Ceramic Capacitors**
Proceedings, Spring Meeting, Materials Research Society, San Francisco, April 27-May 1, 1992, 269, pp. 223-29 (Pittsburgh: Materials Research Society, 1992)
R. J. Lauf, C. Hamby. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. E. Holcombe. Y-12 Plant, Oak Ridge, Tenn.
- 532 Elevated-Temperature Environmental Embrittlement and Alloy Design of Li₂ Ordered Intermetallics**
Mater. Sci. Eng. A153, pp. 538-47 (1992)
M. Takeyama. National Research Institute for Metals, Tokyo, Japan
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 533 First Principles Theory of Alloy Phase Stability. Ordering and Pre-Martensitic Phenomena in Beta-Phase NiAl**
Proceedings, NATO Advanced Research Workshop on Ordered Intermetallics—Physical Metallurgy and Mechanical Behaviour, Irsee, Germany, June 23–29, 1991, pp. 15–36
(The Netherlands: Kluwer Publishers, 1992)
G. M. Stocks, W. A. Shelton, D. M. Nicholson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
F. J. Pinski. University of Cincinnati, Cincinnati, Ohio
B. Ginatempo. University of Messina, Messina, Italy
A. Barbieri, B. L. Gyorffy. University of Bristol, Bristol, Great Britain
D. D. Johnson. Sandia National Laboratory, Livermore, Calif.
J. B. Staunton. University of Warwick, Coventry, Great Britain
P. E. A. Turchi, M. Sluiter. Lawrence Livermore National Laboratory, Livermore, Calif.
- 534 Cracking Behavior of FeAl (40 at. % Al) Alloys During Cutting Operations**
Scr. Metall. **26**, pp. 1669–74 (1992)
P. A. Ferguson. North Carolina State University, Raleigh, N.C.
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 535 The Role of Microscopy in the Alloy Design of Ni- and Fe-Based Aluminides**
Proceedings of the 50th Annual Meeting of the Electron Microscope Society of America, Boston, August 16–21, 1992, pp. 168–69 (San Francisco Press, 1992)
J. A. Horton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 536 Multiple-Ion Irradiations: Facility Review and Highlights of Applications to Metals, Ceramics, and Polymers**
Proceedings of the 16th International Symposium on Effects of Radiation on Materials, Denver, June 21–22, 1992 (Philadelphia, Pa.: American Society for Testing and Materials, 1992)
L. K. Mansur, E. H. Lee, M. B. Lewis, S. J. Zinkle. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 537 Multiple-Scattering Theory and the Quadratic Korringa-Kohn-Rostoker Method**
Phys. Rev. B **44**(16), pp. 8467–72 (October 15, 1991)
J. S. Faulkner, E. A. Horvath. Florida Atlantic University, Boca Raton, Fla.
D. M. Nicholson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 538 Models for Heat Transport Through Assemblies of Uniform-Diameter Hollow Spheres**
ORNL/TM-11397 (April 1991)
D. W. Yarbrough, D. L. McElroy, F. J. Weaver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 539 Ground State Properties and Magnetism in Substitutionally Disordered Fe_{1-x}Cr_x Alloys**
Proceedings of the Spring Meeting, Materials Research Society, San Francisco, April 18–20, 1990 **186**, pp. 27–31 (Pittsburgh: Materials Research Society, 1991)
W. A. Shelton, Jr. Computational Physics, Inc., Annandale, Va.
F. J. Pinski. University of Cincinnati, Cincinnati, Ohio
D. D. Johnson. Sandia National Laboratory, Livermore, Calif.
D. M. Nicholson, G. M. Stocks. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 540 Crystal Growth and Deformation Behavior of TiAl Aluminides**
ORNL/TM-11159 (April 1990)
B. F. Oliver, B. Y. Huang. University of Tennessee, Knoxville, Tenn.
W. C. Oliver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 541 Energy Applications of High-Temperature Superconductivity**
ER-6682, Volumes 1-2 (Palo Alto, Calif.: Electric Power Research Institute, 1990)
S. J. Dale. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. M. Wolf. Office of Conservation and Renewable Energy, U.S. Department of Energy, Washington, D. C.
T. R. Schneider. Electric Power Research Institute, Palo Alto, Calif.
- 542 Brittle Fracture and Grain Boundary Chemistry of Microalloyed NiAl**
J. Mater. Res., pp. 754-62 (1990)
E. P. George, C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 543 The Effect of Processing on the Toughness of a Nickel Aluminide Alloy**
Scripta Met. **24**, pp. 845-50 (1990)
D. J. Alexander. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 544 Brittle Fracture and Grain Boundary Chemistry of Microalloyed NiAl**
J. Mater. Res. **5**, p. 754 (1990)
E. P. George, C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 545 Temperature and Pressure Effects for Oxygen Adsorption and Oxidation of Ni₃Al Alloyed with Chromium and Zirconium**
Surface Science **225**, pp. 195-205 (1990)
A. M. Venezia, C. M. Loxton. University of Illinois Urbana-Champaign, Champaign, Ill.
J. A. Horton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 546 Superplasticity in an Ni₃Al Base Alloy with 8 wt % Cr**
J. Mater. Sci. **25**(7), pp. 3142-48 (1990)
A. Choudhury, A. K. Mukherjee. University of California, Davis, Calif.
V. K. Sikka. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 547 Ab Initio Study of the Cu-Pd One-Dimensional Long Period Superstructure Phase Diagram**
Acta Metall. Mater. **38**(11), pp. 2299-2308 (1990)
G. Ceder, D. de Fontaine. University of California, Berkeley, Calif.
H. Dreyse. Universite de Nancy, France
D. M. Nicholson, G. M. Stocks. Oak Ridge National Laboratory, Oak Ridge, Tenn.
B. L. Gyorffy. University of Bristol, United Kingdom
- 548 High Critical Current Densities in YBa₂Cu₃O_{7-x} Films on Polycrystalline Zirconia**
Applied Physics Letters **57**, pp. 1164 (1990)
D. P. Norton, D. H. Lowndes, J. D. Budai, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. C. Jones. University of Tennessee, Knoxville, Tenn.
K. W. Lay, J. E. Tkaczyk. General Electric Company, Schenectady, N.Y.

- 549 Y-Ba-Cu-O Thin Films Grown on Rigid and Flexible Polycrystalline Yttria-Stabilized Zirconia by Pulsed Laser Ablation**
J. Applied Physics **68**, pp. 223-27 (1990)
D. P. Norton, D. H. Lowndes, J. D. Budai, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. W. McCamy, E. C. Jones. University of Tennessee, Knoxville, Tenn.
T. D. Ketcham, D. St. Julien. Corning, Corning, N.Y.
K. W. Lay, J. E. Tkaczyk. General Electric Company, Schenectady, N.Y.
- 550 Selection of Corrosion-Resistant Materials for Use in Molten Nitrate Salts**
ORNL/TM-11162 (October 1989)
P. F. Tortorelli, P. S. Bishop, J. R. DiStefano. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 551 An Investigation of Elastic Guided Waves for Ceramic Joint Evaluation**
ORNL/TM-10931 (October 1989)
W. A. Simpson, Jr., R. W. McClung. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 552 High-Temperature Ordered Intermetallic Alloys III**
ORNL/M-924 (August 1989)
C. T. Liu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
A. I. Taub. General Electric Corp., Schenectady, N.Y.
N. S. Stoloff. Rensselaer Polytechnic Institute, Troy, N.Y.
C. C. Koch. North Carolina State University, Raleigh, N.C.
- 553 Alloy Development and Mechanical Properties of Nickel Aluminide (Ni_3Al) Alloys**
ORNL-6483 (August 1989)
C. T. Liu, V. K. Sikka, J. A. Horton, E. H. Lee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 554 Materials by Design: Assessment of Theoretical and Experimental Tools for Applied Research and Exploratory Development in Certain Energy Technologies**
ORNL/Sub/86-00210/1 (February 1989)
R. W. Broach, R. A. Eades. Allied-Signal Engineered Materials, Des Plaines, Ill.
J. J. Low. University of Wisconsin, Milwaukee, Wis.
T. L. Barr. Consultant to ORNL, Toulumne, Calif.
J. W. Frazer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. A. Carpenter, Jr. National Institute for Standards and Technology, Gaithersburg, Md.
- 555 Inorganic and Biomass-Derived Plastics: Viable Economic Alternatives to Petrochemical Plastics?**
ORNL/TM-10880 (February 1989)
T. R. Curlee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 556 The Feasibility of Recycling Plastic Wastes: An Update**
Journal of Environmental Systems **18**, pp. 193-212 (1989)
T. R. Curlee. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 557 Microstructures of Ni_3Al Alloys as a Function of Cr and Al Levels**
Proceedings of the 47th Annual Meeting, Electron Microscopy Society of America, San Antonio, Texas, August 6-11, 1989, pp. 306-307 (San Francisco: San Francisco Press, Inc., 1989)
J. A. Horton. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 558 Fabrication and Mechanical Properties of $\text{Ni}_3\text{Al}-\text{Al}_2\text{O}_3$ Composites**
High-Temperature Ordered Intermetallic Alloys III: Symposium Held November 29–December 1, 1988, Boston, Massachusetts. Materials Research Society Symposia Proceedings 133, ed. C. T. Liu et al., pp. 607–14 (Pittsburgh: Materials Research Society, 1989)
C. G. McCarney, J. A. Horton, T. N. Tiegs, E. K. Ohriner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. L. Povirk. Brown University, Providence, R.I.
- 559 Structure Maps and Phase Stability in AlTi_3 Alloyed with Rare-Earth Elements**
High-Temperature Ordered Intermetallic Alloys III: Symposium Held November 29–December 1, 1988, Boston, Massachusetts. Materials Research Society Symposia Proceedings 133, ed. C. T. Liu et al., pp. 37–43 (Pittsburgh: Materials Research Society, 1989)
C. T. Liu, J. A. Horton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. G. Pettifor. Imperial College of Science and Technology, London, England
- 560 The Development of Alloys Based on Ni_3Si**
High-Temperature Ordered Intermetallic Alloys III: Symposium Held November 29–December 1, 1988, Boston, Massachusetts. Materials Research Society Symposia Proceedings 133, ed. C. T. Liu et al., pp. 397–402 (Pittsburgh: Materials Research Society, 1989)
W. C. Oliver. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 561 Applications of the Quadratic Korringa-Kohn-Rostoker Band-Theory Method**
Phys. Rev. B **39**, pp. 8187–92 (1989)
D. M. Nicholson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. S. Faulkner. Florida Atlantic University, Boca Raton, Fla.
- 562 Analysis of Heat-Affected Zone Cracking in Ni_3Al Alloy Welds by Computer Modeling of Thermal Stresses**
Welding J. **68**(1), pp. 19s–27s (1989)
M. L. Santella, S. A. David. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. C. Maguire. Colorado School of Mines, Golden, Colo.

TRIBOLOGY

- 563** *Fast Fourier Transform Analysis of Computer-Acquired Friction Data*
Trib. Trans. **37**(1), p. 201 (January 1994)
 C. S. Yust. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 564** *Tribological Behavior of Whisker Reinforced Ceramic Composite Materials*
Friction and Wear of Ceramics, ed. S. Jahanmir, p. 199 (New York: Marcel Dekker, 1994)
 C. S. Yust. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 565** *Development of a Theory of the Wear of Ceramics*
 ORNL/Sub/93-07802 (October 1993)
 W. O. Winer, R. S. Cowan. Georgia Institute of Technology, Atlanta, Georgia
- 566** *Advanced Tribomaterials for the 90's and Beyond*
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992, pp. 165-70 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
 P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 567** *Friction Microprobe Investigation of Particle Layer Effects on Sliding Friction*
Wear **162**, p. 102 (1993)
 P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 568** *A Retrospective Survey of the Use of Simulative Laboratory Tests to Address Internal Combustion Engine Tribology Problems*
Wear Test Selection for Design and Application, ed. A. W. Ruff and R. G. Bayer, p. 133 (Philadelphia: American Society for Testing and Materials, 1993)
 P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 569** *A Comparison of Three Microindentation Hardness Scales at Low and Ultra-Low Loads*
Mater. Charact. **30**, pp. 287-93 (1993)
 P. J. Blau, J. R. Keiser, R. L. Jackson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 570** *Relating Laboratory Friction Coefficient Values to Practical Applications*
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 571-77 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
 P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 571** *Wear Mode Transition in a Silicon Nitride-Silicon Carbide Whisker Composite*
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 579-86 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
 C. S. Yust. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 572** *Wear-Resistant Materials*
Advanced Materials and Processes Technological Forecast Issue, pp. 25-26 (January 1990)
 P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 573 Sliding Friction and Wear Behavior of Nickel Aluminide Alloys**
Trib. International **23**(4), pp. 226–34 (1990)
P. J. Blau, C. E. DeVore. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 574 Friction Microprobe Studies of Composite Surfaces**
Tribology of Composite Materials, pp. 59–68 (Materials Park, Ohio: ASM International, 1990)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 575 Friction and Wear of Whisker-Reinforced Ceramic Composite Materials**
Tribology of Composite Materials, pp. 25–33 (Materials Park, Ohio: ASM International, 1990)
C. S. Yust. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 576 Morphological Aspects of the Friction of Hot-Filament Grown Diamond Thin Films**
Mechanics of Coatings, pp. 399–408 (Elsevier Publ., 1990)
P. J. Blau, C. S. Yust, L. J. Heatherly, R. E. Clausing. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 577 Elastic Behavior of Coated Rough Surfaces**
Mechanics of Coatings, pp. 157–68 (Elsevier Publ., 1990)
J. I. McCool. MRC-SKF Aerospace, King of Prussia, Pa.
- 578 A Study of the Tribological and Surface Micromechanical Properties of $YBa_2Cu_3O_{7-x}$. Final Report**
ORNL/TM-11053 (July 1989)
P. J. Blau, C. E. DeVore, D. F. Wilson, J. R. Keiser. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 579 Friction and Wear Transitions of Materials: Break-in, Run-in, and Wear-in**
Park Ridge, N.J.: Noyes Publications, 1989
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 580 The Units of Wear Revisited**
Lubrication Engineering **45**, p. 609 (1989)
P. J. Blau. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 581 Temperature Effects on the Break-In of Nickel Aluminide Alloys**
Proceedings International Conference on Wear of Materials, Denver, Colo., April 8–11, 1989, ASME Book No. H0456A, Vol. 1, pp. 305–12 (New York: American Society of Mechanical Engineers, 1989)
P. J. Blau, C. E. DeVore. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 582 Interpretations of the Sliding Friction Break-In Curves of Alumina-Aluminum Couples**
Wear **129**, pp. 81–92 (1989)
P. J. Blau, C. E. DeVore. Oak Ridge National Laboratory, Oak Ridge, Tenn.

ENERGY-RELATED INVENTIONS PROGRAM

- 583 *A Comparison Group Analysis of DOE's Energy-Related Inventions Program***
ORNL/CON-365 (June 1993)
M. A. Brown, T. R. Curlee, S. R. Elliott, C. A. Franchuk. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 584 *Government Promotion of Energy Innovations: An Evaluation of the Energy-Related Inventions Program***
Policy Studies Journal 20(1), pp. 87-101 (1992)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. R. Wilson. University of Tennessee, Knoxville, Tenn.
- 585 *The Energy-Related Inventions Program: A Decade of Commercial Progress***
ORNL/CON-339 (December 1991)
M. A. Brown, C. A. Franchuk. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. R. Wilson. University of Tennessee, Knoxville, Tenn.
- 586 *Guidelines for Successfully Transferring Government-Sponsored Innovations***
Research Policy 20(2): pp. 121-43 (April 1991)
M. A. Brown, L. G. Berry, R. K. Goel. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 587 *The Energy-Related Inventions Program: Commercial Progress of Participants Through 1988***
ORNL/CON-301 (May 1990)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
C. R. Wilson. University of Tennessee, Knoxville, Tenn.
- 588 *The Cost of Commercializing Energy Inventions***
Research Policy 19(2), pp. 147-55 (1990)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 589 *Promoting the Commercialization of Energy Innovations: An Evaluation of the Energy-Related Inventions Program***
Proceedings of the National Energy Program Evaluation Conference, Chicago, August 23-25, 1989, pp. 33-38 (Argonne, Ill.: Argonne National Laboratory, August 1989)
M. A. Brown. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 590 *Commercializing Government-Sponsored Innovations: Twelve Successful Buildings Case Studies***
ORNL/CON-275 (January 1989)
M. A. Brown, L. G. Berry, R. K. Goel. Oak Ridge National Laboratory, Oak Ridge, Tenn.

POWER SYSTEMS TECHNOLOGY

- 591 Detection of S₂F₁₀ Produced by a Single Spark Discharge in SF₆**
J. Appl. Phys. 74(3), pp. 2103-5 (August 1993)
 I. Sauers. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 S. M. Mahajan. Tennessee Technological University, Cookeville, Tenn.
- 592 Investigation of S₂F₁₀ Production and Mitigation in Compressed SF₆-Insulated Power Systems**
IEEE Electrical Insulation Magazine 9(3), pp. 29-40 and 51 (May/June 1993)
 D. R. James, ed., I. Sauers, G. D. Griffin. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 R. J. Van Brunt, J. K. Olthoff, K. L. Stricklett. National Institute of Standards and Technology, Gaithersburg, Md.
 F. Y. Chu, J. R. Robins, H. D. Morrison. Ontario Hydro Research Division, Toronto, Ontario
- 593 Geomagnetic Storm Environments and Effects on Electrical Systems**
Proceedings 10th International Zurich Symposium and Technical Exhibition on Electromagnetic Compatibility, Zurich, Switzerland, March 9-11, 1993, pp. 105-110 (Zurich: ETH Zentrum, March 1993)
 P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 F. M. Tesche. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 594 Electromagnetic Pulse Research on Electric Power Systems: Program Summary and Recommendations**
 ORNL-6708 (January 1993)
 P. R. Barnes, B. W. McConnell, J. W. Van Dyke. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 F. M. Tesche, E. F. Vance. Consultants to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 595 Recommended Engineering Practice to Enhance the EMI/EMP Immunity of Electric Power Systems**
 ORNL/Sub/91-SG913/1 (December 1992)
 C. L. Wagner. Department of Energy, Washington, D. C.
 W. E. Feero. Electric Research and Management, Inc., State College, Pa.
- 596 Proceedings, Workshop on Real-Time Control and Operation of Electric Power Systems, November 19-21, 1991, Denver, Colorado**
 CONF-9111173 (Oak Ridge, Tenn.: Oak Ridge National Laboratory, July 1992)
 D. T. Rizy, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 W. E. Myers, ed. Bonneville Power Administration, Portland, Ore.
 L. E. Elts, C. L. Clemans. Western Area Power Administration, Golden, Colo.
- 597 Experimental Investigation of Steep-Front, Short Duration (SFSD) Surge Effects on Power Systems Components**
 ORNL/Sub/87-91345 (May 1992)
 D. B. Miller. Mississippi State University, Mississippi State, Miss.
- 598 Mitigation of Magnetohydrodynamic Electromagnetic Pulse (MHD-EMP) Effects from Commercial Electric Power Systems**
 ORNL-6709 (March 1992)
 P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 F. M. Tesche, E. F. Vance. Consultants to Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 599 HEMP-Induced Transients in Electric Power Substations**
ORNL/Sub/88-SC863 (February 1992)
C. M. Wiggins, D. E. Thomas, T. M. Salas. BDM International Inc., Albuquerque, N. Mex.
- 600 An Approach to Metering and Network Modeling**
Proceedings of the American Power Conference 54-II, pp. 1068-74 (Chicago: Illinois Institute of Technology, 1992)
M. M. Adibi. IRD Corporation, Bethesda, Md.
K. A. Clements. Worcester Polytechnic Institute, Worcester, Mass.
R. J. Kafka. Potomac Electric Power Company, Washington, D. C.
J. P. Stovall. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 601 Transient Electric and Magnetic Fields Associated with Establishing a Finite Electrostatic Dipole, Revisited**
IEEE Transactions on Electromagnetic Compatibility 33(4), pp. 312-20 (November 1991)
M. Rubinstein, M. A. Uman. University of Florida, Gainesville, Fla.
- 602 Maintaining Electric Power System Performance: Preparing for the Year 2020 Research Needs**
ORNL-6678 (November 1991)
S. J. Dale, J. P. Stovall. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. W. Klein. Department of Energy, Washington, D. C.
- 603 Electric Utility Industry Experience with Geomagnetic Disturbances**
ORNL-6665 (September 1991)
P. R. Barnes, D. T. Rzy, B. W. McConnell. Oak Ridge National Laboratory, Oak Ridge, Tenn.
F. M. Tesche. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. R. Taylor, Jr. ABB Power Systems, Inc., Pittsburgh, Pa.
- 604 EMP Research on Electric Power Systems. Program Update**
ORNL/M-1392 (May 1991)
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 605 Assessment of Conducting Polymer Applications in Power Equipment Technology**
ORNL/Sub/87-SA681/1 (May 1991)
K. F. Schoch, Jr., A. I. Bennett, R. R. Burghardt, A. H. Cookson, H. E. Saunders, J. D. B. Smith. Westinghouse Electric Corp., Pittsburgh, Pa.
W. N. Kennedy. ABB Power Transmission & Distribution Co., Pittsburgh, Pa.
T. V. Oommen. ABB Power Transmission & Distribution Co., Sharon, Pa.
R. E. Voshall. Gannon University, Erie, Pa.
E. M. Fort. Westinghouse Electric Corp., Orlando, Fla.
B. Robbins. Reynolds Metals Co., Richmond, Va.
- 606 Impacts of a Nominal Nuclear Electromagnetic Pulse on Electric Power Systems. Phase III Final Report**
ORNL/Sub/83-43374/2 (April 1991)
V. J. Kruse, D. L. Nickel, J. J. Bonk, E. R. Taylor, Jr. ABB Power Systems, Inc., Advanced Systems Technology, Pittsburgh, Pa.

- 607 Impact of Steep-Front Short-Duration Impulse on Electric Power System Insulation. Phase II: Laboratory Evaluation of Selected Power System Components**
ORNL/Sub/85-28611/2 (April 1991)
L. M. Burrage, E. F. Veverka, J. H. Shaw. Cooper Power Systems, Franksville, Wis.
B. W. McConnell. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 608 System Reconfiguration Analysis Program (SYSRAP) User's Manual**
ORNL-6575 (April 1991)
J. B. Patton. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. T. Rizy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. S. Lawler. University of Tennessee, Knoxville, Tenn.
- 609 On Estimation of Uncertainties in Analog Measurements**
IEEE Trans. Power Systems 5(4), pp. 1222-28 (November 1990)
M. M. Adibi. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. P. Stovall. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 610 Induced Voltage on an Overhead Line Due to Nearby Lightning**
IEEE Trans. Electromagnetic Compatibility 32(4), pp. 292-99 (November 1990)
G. Diendorfer. Technical University, Vienna, Austria
- 611 An Improved Return Stroke Model with Specified Channel-Base Current**
Journal of Geophysical Research 95(D9), pp. 13,621-44 (August 20, 1990)
G. Diendorfer. Technical University, Vienna, Austria
M. A. Uman. University of Florida, Gainesville, Fla.
- 612 Updated Evaluation of Polymer Films for Electrical Insulation**
ORNL-6603 (August 1990)
H. E. McCoy, Jr. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 613 Polarization Currents in Varistors**
J. Appl. Phys. 68(1), pp. 339-45 (July 1990)
F. A. Modine. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. W. Major. University of Richmond, Va.
S.-I. Choi, L. B. Bergman, M. N. Silver. University of North Carolina, Chapel Hill, N.C.
- 614 Transient Response of a Distribution Circuit Recloser and Control Unit to a High-Altitude Electromagnetic Pulse (HEMP) and Lightning**
IEEE Trans. Electromagnetic Compatibility 32(2), pp. 113-24 (May 1990)
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
F. M. Tesche. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 615 Pulse Response Characteristics of ZnO Varistors**
J. Appl. Phys. 67(10), pp. 6560-66 (May 1990)
F. A. Modine. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. B. Wheeler. Los Alamos National Laboratory, Los Alamos, N. Mex.
- 616 Load Flow Studies in the Presence of Magnetohydrodynamic Electromagnetic Pulse**
IEEE Trans. Power Delivery 5(2), pp. 1158-63 (April 1990)
V. J. Kruse, G. B. Rackcliffe. Westinghouse Electric Corp., Pittsburgh, Pa.
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 617 Applications Software for Modeling Distribution Automation Operations on the Athens Utilities Board**
IEEE Trans. Power Delivery 5(2), pp. 1019–25 (April 1990)
J. B. Patton. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. T. Rizy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. S. Lawler. University of Tennessee, Knoxville, Tenn.
- 618 Flashover Vulnerability of Transmission and Distribution Lines to High-Altitude Electromagnetic Pulse (HEMP)**
IEEE Trans. Power Delivery 5(2), pp. 1164–69 (April 1990)
V. J. Kruse. Westinghouse Electric Corp., Pittsburgh, Pa.
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
F. M. Tesche. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 619 The Effects of Steep-Front Short-Duration Impulses on Power Distribution Component**
IEEE Trans. Power Delivery 5(2), pp. 708–15 (April 1990)
D. B. Miller, A. E. Lux, S. Grzybowski. Mississippi State University, Mississippi State, Miss.
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 620 On the Radiation Field Turn-on Term Associated with Travelling Current Discontinuities in Lightning**
Journal of Geophysical Research 95(D4), pp. 3711–13 (March 1990)
M. Rubinstein, M. A. Uman. University of Florida, Gainesville, Fla.
- 621 Analysis of Power Sector Efficiency Improvements for an Integrated Utility Planning Process in Costa Rica**
Proceedings 25th Intersociety Energy Conversion Engineering Conference 4, pp. 386–92 (New York: American Institute of Chemical Engineers, 1990)
D. B. Waddle, J. M. MacDonald. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 622 Measurement of Partial Discharges in Hexane Under DC Voltage**
IEEE Trans. Electr. Insul. 24, pp. 1109–19 (December 1989)
E. F. Kelley, M. Nehmadi, R. E. Hebner. National Institute for Standards and Testing, Gaithersburg, Md.
M. O. Pace, A. L. Wintenberg, T. V. Blalock, J. V. Foust. University of Tennessee, Knoxville, Tenn.
- 623 Integrated Hierarchical Computer Systems for Adaptive Protective Relaying and Control of Electric Transmission Power Systems**
ORNL/Sub/85-22005/1 (November 1989)
A. G. Phadke. Virginia Polytechnic Institute and State University, Blacksburg, Va.
S. H. Horowitz. American Electric Power Company, Inc., Columbus, Ohio
J. S. Thorp. Cornell University, Ithaca, N.Y.
- 624 Adaptive Protective Relaying of Transmission Power Systems for Improved Reliability**
ORNL/Sub/85-22012/1 (September 1989)
G. D. Rockefeller, R. T. Byerly, W. E. Feero, C. L. Wagner. Electric Research and Management, Inc., State College, Pa.
K. L. Hicks. Stone & Webster Engineering Corp., Boston, Mass.
J. R. Linders. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. Nichol. A. D. Little, Inc., Cambridge, Mass.

- 625 HEMP Test and Analysis of Selected Recloser-Control Units**
ORNL/Sub/88-00238/1 (August 1989)
T. K. Liu, S. H. Sands. LuTech, Inc., Oakland, Calif.
F. M. Tesche. E-Systems, Inc., Greeneville, Texas
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 626 Zinc Oxide Varistor Response Time**
Proceedings of the Second International Varistor Conference on Zinc Oxide Varistors: Science and Technology, Schenectady, New York, December 5-7, 1988 3, pp. 176-85 (Westerville, Ohio: American Ceramic Society, 1989)
F. A. Modine. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. W. Major. University of Richmond, Richmond, Va.
S.-I. Choi, L. B. Bergman, M. N. Silver. University of North Carolina, Chapel Hill, N.C.
- 627 Automating Electric Utility Distribution Systems: The Athens Automation and Control Experiment**
New York: Prentice Hall, 1989
P. A. Gnadt, J. S. Lawler. Consultants to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 628 The HEMP Response of an Overhead Power Distribution Line**
IEEE Trans. Power Delivery 4, pp. 1937-44 (1989)
F. M. Tesche. E-Systems, Inc., Greeneville, Texas
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 629 Analysis of Water Heater Data from Athens Load Control Experiment**
IEEE Trans. Power Delivery 4, pp. 1232-38 (1989)
J. H. Reed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. C. Thompson, R. P. Broadwater, A. Chandrasekaran. Tennessee Technological University, Cookeville, Tenn.
- 630 Pulsed Charge Transport in Polycrystalline Zinc Oxide**
Bulletin of the American Physical Society 34, p. 999 (1989)
J. F. Cordaro. Alfred University, Alfred, N.Y.
F. A. Modine. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 631 The Induced Current in Parallel Wires Over an Imperfect Ground From an Incident EMP**
Proceedings 1989 Southeastcon, IEEE Regional Meeting, University of South Carolina, Columbia, S.C., April 1989, Vol. 2 (New York: IEEE, 1989)
H. P. Neff, Jr. University of Tennessee, Knoxville, Tenn.
D. A. Reed. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 632 Spark Decomposition of SF₆: Chemical and Biological Studies**
IEEE Trans. Power Delivery 4, pp. 1541-551 (1989)
G. D. Griffin, I. Sauers, C. E. Easterly. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. Kurka. University of Tennessee, Knoxville, Tenn.
- 633 Distribution Automation Applications Software for the Athens Utilities Board**
IEEE Trans. Power Delivery 4, pp. 715-24 (1989)
D. T. Rizy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. S. Lawler. University of Tennessee, Knoxville, Tenn.
J. B. Patton. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
N. H. Fortson. Athens Utilities Board, Athens, Tenn.

- 634 Impact of Automation on the Reliability of the Athens Utilities Board's Distribution System**
IEEE Trans. Power Delivery 4, pp. 770-78 (1989)
L. D. Monteen. Athens Utilities Board, Athens, Tenn.
J. S. Lawler, J. S. Lai. University of Tennessee, Knoxville, Tenn.
J. B. Patton. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. T. Rzy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 635 A Multiconductor Model for Determining the Response of Power Transmission and Distribution Lines to a High Altitude Electromagnetic Pulse (HEMP)**
IEEE Trans. Power Delivery 4, pp. 1955-64 (1989)
F. M. Tesche. E-Systems, Inc., Greenville, Texas
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 636 Steep Front-Short Duration Voltage Surge Tests of Power Line Filters and Transient Voltage Suppressors**
IEEE Trans. Power Delivery 4, pp. 1029-36 (1989)
P. R. Barnes, T. L. Hudson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 637 Instrumentation System Used to Determine the Effects of Steep Front-Short Duration Impulses on Electric Power System Insulation**
IEEE Trans. Power Delivery 4, pp. 938-41 (1989)
J. H. Shaw. McGraw-Edison Power Systems, Franksville, Wis.
- 638 Experimental Determination of the Effects of Steep Front-Short Duration Surges on 25 KVA Pole Mounted Distribution Transformers**
IEEE Trans. Power Delivery 4, pp. 1103-10 (1989)
C. H. Eichler, J. R. Legro. Westinghouse Electric Corp., Pittsburgh, Pa.
P. R. Barnes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 639 Measuring and Analyzing the Impact of Voltage and Capacitor Control with High Speed Data Acquisition**
IEEE Trans. Power Delivery 4, pp. 704-14 (1989)
D. T. Rzy, W. R. Nelson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. S. Lawler. University of Tennessee, Knoxville, Tenn.
J. B. Patton. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 640 Monitoring Load Control at the Feeder Level Using High Speed Monitoring Equipment**
IEEE Trans. Power Delivery 4, pp. 694-703 (1989)
J. H. Reed, W. R. Nelson, G. R. Wetherington, E. R. Broadaway. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 641 The Origin of the Pulse Response Characteristics of Zinc Oxide Varistors**
J. Appl. Phys. 66, pp. 5608-12 (1989)
F. A. Modine, R. B. Wheeler. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. Shim, J. F. Cordaro. Alfred University, Alfred, N.Y.
- 642 Load Control Experiments With Heat Pumps During the Winter**
IEEE Trans. Power Delivery 4, pp. 646-52 (1989)
J. H. Reed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. P. Broadwater, A. Chandrasekaran. Tennessee Technological University, Cookeville, Tenn.

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- 643** *Observed Regimes of Collective Flux Creep in Proton-Irradiated, Single Crystal YBaCuO: Dependence on Current Density*
Phys. Rev. B 49(18), p. 13287 (May 1994)
 J. R. Thompson, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 Y. R. Sun. University of Tennessee, Knoxville, Tenn.
 L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 644** *Single Step Synthesis of Bulk HgBa₂Ca₂Cu₃O_{8+δ} Superconductors*
Physica C 222(1-2), p. 7 (March 10, 1994)
 M. Paranthaman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 645** *Thermoelectric Power and Resistivity of Bulk HgBa₂CuO_{4+y} Superconductors and the Effects of Annealing*
Physica C 222(1-2), p. 47 (March 10, 1994)
 C. K. Subramaniam, A. B. Kaiser. Victoria University of Wellington, Wellington, New Zealand.
 M. Paranthaman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 646** *ORNL Superconducting Technology Program for Electric Power Systems—Annual Report for FY 1993*
 ORNL/HTSCP-5 (March 1994)
 R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 647** *Fabrication and Testing of High Temperature Superconducting Wires and Coils*
 ORNL/M-3313 (February 1994)
 R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 648** *Development of a Commercially Viable Manufacturing Process for Making Low, Uniform, Continuous Lengths of High Temperature Superconducting Wire*
 ORNL/M-3314 (February 1994)
 R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 649** *Synthesis and Magnetic Characterization of (Tl_{0.5}Pb_{0.5})Sr₂Ca₂Cu₃O₉ and Tl₂Ba₂CaCu₂O₈ Bulk Superconductors*
Physica C 219(3-4), p. 413 (January 15, 1994)
 M. Paranthaman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 M. Foldeaki, R. Tello, A. M. Hermann. University of Colorado, Boulder, Colo.
- 650** *Local Texture and Percolative Paths for Long-Range Conduction in High Critical Current Density TlBa₂Cu₃O_{8+x} Deposits*
Appl. Phys. Lett. 64(1), pp. 106-108 (January 3, 1994)
 D. M. Kroeger, A. Goyal, E. D. Specht, Z. L. Wang. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 J. E. Tkaczyk, J. A. Sutliff, J. A. DeLuca. General Electric Corp. R&D Center, Schenectady, N. Y.

- 651 The Effect of Geometry on the Critical Currents of Thin Films**
Phys. Rev. B 49(2), p. 1274 (January 1, 1994)
G. Stejic, A. Gurevich, E. Kadyrov, R. Joynt, D. C. Larbalestier. University of Wisconsin, Madison, Wisc.
D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 652 On the Connection Between the Normal Zone Voltage and the Hot Spot Temperature in Uncooled Magnets**
Cryogenics 34(2), pp. 111-18 (1994)
L. Dresner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 653 Thallium-Based High- T_c Superconducting Oxides—A Summary**
in *Organic Conductors: Fundamentals and Applications*, ed. J. P. Farges (New York: Marcel Dekker, 1994)
M. Paranthaman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
A. M. Hermann. University of Colorado, Boulder, Colo.
- 654 Quench Energies of Uncooled Superconductors**
Cryogenics 34(1), pp. 77-82 (1994)
L. Dresner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 655 Vortex Fluctuation, Magnetic Penetration Depth, and H_{c2} in Hg- and Tl-Based High- T_c Superconductors**
Phys. Rev. B 48(18), pp. 14031-34 (November 1, 1993)
J. R. Thompson, J. G. Ossandon, D. K. Christen, B. C. Chakoumakos, M. Paranthaman, J. Brynstad. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 656 Grain-Boundary Chemistry and Weak-Link Behavior of Polycrystalline $YBa_2Cu_4O_8$**
Phys. Rev. B 48(13), pp. 9726-34 (October 1, 1993)
Z. L. Wang, J. Brynstad, D. M. Kroeger, J. R. Thompson, R. K. Williams. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 657 A Teacher's Guide to Superconductivity for High School Students**
ORNL/M-3063 (October 1993)
R. W. Dull. Largo High School, Largo, Fla.
H. R. Kerchner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 658 Oxygen Tracer Diffusion in $YBa_2Cu_4O_8$**
Phys. Rev. B 48(10), p. 7505 (September 1, 1993)
J. L. Routbort, S. J. Rothman, J. N. Mundy. Argonne National Laboratory, Argonne, Ill.
J. E. Baker. University of Illinois, Urbana, Ill.
B. Dabrowski. Northern Illinois University, DeKalb, Ill.
R. K. Williams. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 659 Stability and Protection of Ag/BSCCO Magnets Operated in the 20-40 K Range**
Cryogenics 33(9), pp. 900-909 (September 1993)
L. Dresner. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 660 Synthesis and Magnetic Characterization of the High- T_c Superconducting Compound $HgBa_2CuO_{4+\delta}$**
Physica C 213(3-4), p. 271 (August 15, 1993)
M. Paranthaman, J. R. Thompson, J. R. Brynestad. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 661 Design Considerations for a 1-kWh Energy Storage Magnet**
ORNL/M-2950 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 662 YBCO Films by Metal-Organic Chemical Vapor Deposition**
ORNL/M-2951 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 663 YBCO and BSCCO Thick Film Superconductors on Practical Substrates**
ORNL/M-2952 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 664 Aerosol Powder Synthesis**
ORNL/M-2953 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 665 Multiple Laser Beam and Segmented Target Laser Ablation Application to HTSC Film Deposition**
ORNL/M-2955 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 666 Deposited Conductor Fabrication**
ORNL/M-2956 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 667 In-Situ Monitoring of the Preparation of High T_c Superconducting Films**
ORNL/M-2957 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 668 Microdiffraction Measurements of Correlations in Grain Orientation in High Current, High Temperature Superconductors**
ORNL/M-2986 (August 1993)
E. D. Specht, A. Goyal, D. M. Kroeger, Z. L. Wang. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. E. Tkaczyk, J. A. DeLuca. General Electric Corp. R&D Center, Schenectady, N. Y.
- 669 Development of Large Critical Current High T_c Superconducting Films on Flexible Substrates**
ORNL/M-2958 (August 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 670 Superconductivity: Current Problems at High T_c**
Nature 364(6433), pp. 98-99 (July 8, 1993)
D. K. Christen, J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 671 Current Problems at High T_c**
Nature 364, pp. 98-99 (July 1993)
D. K. Christen, J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 672 Enhanced Transport Critical Current at High Fields After Heavy Ion Irradiation of Textured $TiBa_2Ca_2Cu_3O_x$ Thick Films**
Appl. Phys. Lett. 62(23), pp. 3031-33 (June 7, 1993)
J. E. Tkaczyk, J. A. DeLuca, P. L. Karas, P. J. Bednarczyk. General Electric Corp. R&D Center, Schenectady, N. Y.
D. K. Christen, C. E. Klabunde, H. R. Kerchner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 673 Strong Evidence for Vortex-Glass-Collective-Pinning Theory in $YBa_2Cu_3O_7$ Superconductors**
Phys. Rev. B 47(21), pp. 14481-88 (June 1, 1993)
J. R. Thompson, D. K. Christen, A. Goyal. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun, Y. J. Chen. University of Tennessee, Knoxville, Tenn.
- 674 Effect of Flux Creep on the Temperature Dependence of the Current Density in $YBaCuO$ Crystals**
Phys. Rev. B 47(21), pp. 14440-47 (June 1, 1993)
J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
L. Civale, A. P. Malozemoff, M. W. McElfresh, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 675 Understanding Superconducting Magnetic Energy Storage (SMES) Technology, Applications, and Economics**
ORNL/Sub/88-SM362/1 (June 1993)
B. W. McConnell. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. J. Ferraro. Ferraro, Oliver, and Associates, Inc., Knoxville, Tenn.
- 676 Solidification of $YBa_2Cu_3O_{7-\delta}$ from the Melt**
Physica C 210(1/2), p. 197 (May 15, 1993)
A. Goyal, K. B. Alexander, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.
P. D. Funkenbusch, S. J. Burns. University of Rochester, Rochester, N. Y.
- 677 In-Plane Epitaxial Alignment of $Yba_2Cu_3O_{7-x}$ Films Grown on Silver Crystals and Buffer Layers**
Appl. Phys. Lett. 62(15), pp. 1836-38 (April 12, 1993)
J. D. Budai. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. T. Young, B. S. Chao. Energy Conversion Devices, Inc., Troy, Mich.
- 678 Structural and Chemical Disorder Near the $Y_2BaCuO_5/YBa_2Cu_3O_{7-\delta}$ Interface and Its Possible Relation to the Flux-Pining Behavior in Melt-Textured $YBa_2Cu_3O_{7-\delta}$**
Phys. Rev. B 47(9), pp. 5373-82 (March 1, 1993)
Z. L. Wang. University of Tennessee, Knoxville, Tenn.
A. Goyal, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 679 Effective Vortex Pinning Energy $U_{\text{eff}}(J,T)$ in High- T_c Superconductors with Point- and Line-Like Defects**
Bull. Am. Phys. Soc. **38**, p. 835 (March 1993)
J. R. Thompson, D. K. Christen, H. R. Kerchner, B. C. Sales, B. C. Chakoumakos. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
Y. R. Sun, Y. J. Chen. University of Tennessee, Knoxville, Tenn.
- 680 Effect of Heat Treatment Conditions on Critical Current of $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}/\text{Ag}$ Powder-in-Tube Wires**
Superconductor Science and Technology **6**(2), pp. 106–11 (February 1993)
J. C. Bowker, G. A. Whitlow. Westinghouse Science and Technology Center, Pittsburgh, Pa.
- 681 ORNL Superconducting Technology Program for Electric Energy Systems—Annual Report for FY 1992**
ORNL/HTSPC-4 (February 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 682 The Team Sport of Technology Transfer: Spectators Welcome**
Superconductor Industry Magazine, pp. 12–19 and 30 (Summer 1993)
R. A. Hawsey. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. G. Daley. Office of Energy Efficiency and Renewable Energy, Department of Energy, Washington, D. C.
- 683 Enhanced Transport Critical Current at High Fields After Ag-Ion Irradiation of Polycrystalline $\text{Tl}(1223)$ Films**
Bull. Am. Phys. Soc. **38**, p. 830 (1993)
J. E. Tkaczyk, J. A. DeLuca, P. L. Karas, P. J. Bednarczyk. General Electric Corp. R&D Center, Schenectady, N. Y.
D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 684 Synthesis and Magnetic Characterization of the High- T_c Superconducting Compound $\text{HgBa}_2\text{CuO}_{4+\delta}$**
Physica C **213**, pp. 271–75 (1993)
M. Paranthaman, J. R. Thompson, J. Brynstad. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 685 Vortex Dynamics in YBaCuO Single Crystals with Point- and Line-Like Defects—Flux Creep Studies**
Physica A **200**, pp. 395–402 (1993)
J. R. Thompson, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 686 Electrical Transport Dissipation and Flux Pinning in Superconducting Films with Columnar Defects**
Bull. Am. Phys. Soc. **38**, p. 802 (1993)
D. K. Christen, C. E. Klabunde, H. R. Kerchner, S. Zhu, R. Feenstra, J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. E. Tkaczyk. General Electric Corp. R&D Center, Schenectady, N. Y.
J. M. Phillips. AT&T Bell Laboratories, Murray Hill, N. J.

- 687 Electrical Transport Properties of Oxygen Deficient $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Thin Films**
Bull. Am. Phys. Soc. **38**, p. 272 (1993)
E. C. Jones. University of Tennessee, Knoxville, Tenn.
D. K. Christen, J. R. Thompson, R. Feenstra, S. Zhu, D. H. Lowndes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 688 Superconductive Transport Properties of Heavy Ion Irradiated Epitaxial $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films**
Bull. Am. Phys. Soc. **38**, p. 802 (1993)
S. Zhu, D. K. Christen, C. E. Klabunde, J. R. Thompson, R. Feenstra, D. H. Lowndes, D. P. Norton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. C. Jones. University of Tennessee, Knoxville, Tenn.
- 689 Epitaxial YBaCuO Films on Metal Substrates and Buffer Layers**
Bull. Am. Phys. Soc. **38**, p. 260 (1993)
J. D. Budai, D. P. Norton, B. C. Chakoumakos, R. Feenstra, D. K. Christen, D. H. Lowndes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. T. Young. Energy Conversion Devices, Inc., Troy, Mich.
- 690 DC Magnetization Studies of Anisotropy in Heavy Ion Irradiated $\text{Bi}_2\text{Sr}_2\text{Ca}_1\text{Cu}_2\text{O}_8$ and $\text{Y}_1\text{Ba}_2\text{Cu}_3\text{O}_{7-\delta}$ Single Crystals**
Bull. Am. Phys. Soc. **38**, p. 802 (1993)
J. R. Thompson, D. K. Christen, H. R. Kerchner, C. E. Klabunde, B. C. Sales, B. C. Chakoumakos. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun, Y. J. Chen. University of Tennessee, Knoxville, Tenn.
L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 691 Properties of Aligned $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Superconductor as a Function of Oxygen Deficiency δ**
Appl. Supercond. **1**(3-6), pp. 371-80 (1993)
J. G. Ossandon, University of Tennessee, Knoxville, Tenn.
J. R. Thompson, D. K. Christen, B. C. Sales, H. R. Kerchner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
J. E. Tkaczyk, K. W. Lay. General Electric Corp. R&D Laboratory, Schenectady, N. Y.
- 692 Magnetic Studies of Current Conduction and Flux Pinning in High- T_c Cuprates: Virgin, Irradiated, and Oxygen Deficient Materials**
Proceedings New York State Conference on Superconductivity and Applications, Buffalo, New York, September 15-17, 1992, **273**, pp. 179-88 (New York: American Institute of Physics, 1993)
Y. R. Sun, J. G. Ossandon. University of Tennessee, Knoxville, Tenn.
J. R. Thompson, D. K. Christen, H. R. Kerchner, B. C. Sales, B. C. Chakoumakos. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.

- 693 Magnetization and Flux Pinning in High- T_c Cuprates: Virgin, Irradiated and Oxygen Deficient Materials**
Proceedings 5th U.S./Japan Workshop on High T_c Superconductors, Tsukuba, Japan, Nov. 9–10, 1992, pp. 232–36 (Tokyo: Soc. Non-Traditional Technol., 1993)
Y. R. Sun, J. G. Ossandon. University of Tennessee, Knoxville, Tenn.
J. R. Thompson, D. K. Christen, H. R. Kerchner, B. C. Sales, B. C. Chakoumakos. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. Civale, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 694 Flux-Pinning-Related Defect Structures in Melt-Processed $YBa_2Cu_3O_{7-x}$**
Proc. 51st Annual Meeting Microsc. Soc. Am., Cincinnati, August 1–6, 1993, pp. 936–37 (San Francisco Press, 1993)
Z. L. Wang, A. Goyal, D. M. Kroeger, L. F. Allard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. Kontra. International Business Machines, Essex Junction, Vermont
- 695 Nano-Probe Microanalysis of Grain Boundary Chemistry in $YBa_2Cu_4O_8$ and Its Relationship to Weak-Link Behavior**
Proc. 51st Annual Meeting Microsc. Soc. Am., Cincinnati, August 1–6, 1993, pp. 598–99 (San Francisco Press, 1993)
Z. L. Wang, J. Brynestad, D. M. Kroeger, J. R. Thompson, R. K. Williams. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 696 Irradiation-Enhanced Pinning in $YBa_2Cu_3O_{7-x}$ Crystals**
JOM, pp. 60–64 (October 1992)
L. Civale, T. K. Worthington, L. Krusin-Elbaum, A. D. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. A. Kirk, R. Wheeler. Argonne National Laboratory, Argonne, Ill.
- 697 Protection of a Test Magnet Wound with Ag-BSCCO High-Temperature Superconductor**
ORNL/HTSPC-3 (October 1992)
L. Dresner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 698 Thermodynamics of the Y-Ba-Cu-C-O-H System: Application to the Organometallic Chemical Vapor Deposition of the $YBa_2Cu_3O_{7-x}$ Phase**
J. Am. Ceram. Soc. 75(10), pp. 2679–86 (October 1992)
C. Vahlas. Laboratoire Marcel Mathieu, Centre Helosparc, Paris, France
T. M. Besmann. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 699 Superconducting Transport Properties of Epitaxial $YBa_2Cu_3O_{7-\delta}$ Thin Films: A Consistent Description Based on Thermally Activated Flux Motion**
Phys. Rev. B 46(9), pp. 5576–80 (September 1, 1992)
S. Zhu, E. C. Jones. University of Tennessee, Knoxville, Tenn.
D. K. Christen, C. E. Klabunde, J. R. Thompson, R. Feenstra, D. H. Lowndes, D. P. Norton. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 700 Transport Critical Currents in Spray Pyrolyzed Films of $TiBa_2Ca_2Cu_3O_z$ on Polycrystalline Zirconia Substrates**
Appl. Phys. Lett. 61(5), pp. 610–12 (August 3, 1992)
J. E. Tkaczyk, J. A. DeLuca, P. L. Karas, P. J. Bednarczyk, M. F. Garbauskas, R. H. Arendt, K. W. Lay. General Electric Corporate Research and Development, Schenectady, N. Y.
J. S. Moodera. Francis Bitter National Magnet Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.
- 701 Powder Characteristics and Sintering Behavior of Ag-Doped $YBa_2Cu_3O_{7-x}$ Produced by Aerosol Decomposition**
J. Mater. Res. 7(4), pp. 827–36 (April 1992)
T. L. Ward, T. T. Kodas. University of New Mexico, Albuquerque, N. Mex.
A. H. Carim. Pennsylvania State University, University Park, Pa.
D. M. Kroeger, H. Hsu. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 702 Microstructure Within Domains of Melt-Processed $YB_{12}Cu_3O_{7-x}$ Superconductors**
Phys. Rev. B 45, pp. 5622–27 (March 1992)
K. B. Alexander, A. Goyal, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.
V. Selvamanickam, K. Salama. University of Houston, Houston, Texas
- 703 Proceedings of the HTS Wire Development Workshop, February 1992, 1992. DOE/Office of Utility Technologies Summary of Projects, Superconducting Technology Program for Electric Energy Systems**
CONF-920286 (Oak Ridge, Tenn.: Oak Ridge National Laboratory, February 1992)
R. A. Hawsey, ed. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 704 A Comprehensive Review of the XRD Data of the Primary and Secondary Phases Present in the BSCCO Superconductor System (Part II: Ca-Sr-Pb Oxides)**
ORNL/TM-11949 (February 1992)
B. J. Reardon, C. R. Hubbard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 705 A Comprehensive Review of the XRD Data of the Primary and Secondary Phases Present in the BSCCO Superconductor System (Part I: Ca-Sr-Cu Oxides)**
ORNL/TM-11948 (January 1992)
B. J. Reardon, C. R. Hubbard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 706 Phase Development in the $Bi_2Sr_2CaCu_2O_y$ System: Effects of Oxygen Pressure**
Physica C 202, pp. 134–40 (1992)
F. A. List, H. Hsu, O. B. Cavin, W. D. Porter, C. R. Hubbard, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 707 Interface Microstructures in Melt-Textured $YBa_2Cu_3O_{7-\delta}$ on Ag-Pd and Flux Pinning Centers Introduced by Y_2BaCuO_5 Particles**
Proceedings 50th Annual Meeting, Electron Microscopy Society of America, Boston, August 16–21, 1992, pp. 72–73 (Electron Microscopy Society of America, 1992)
Z. L. Wang. University of Tennessee, Knoxville, Tenn.
A. Goyal, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 708 *T_c- δ Relations in YBa₂Cu₃O_{7- δ} Thin Films: Effects of Oxygen Pressure During Growth***
Proceedings, Spring Meeting, Materials Research Society, 275, pp. 101-106
(Pittsburgh: Materials Research Society, 1992)
R. Feenstra, D. P. Norton, J. D. Budai, D. K. Christen, D. H. Lowndes. Oak Ridge National Laboratory, Oak Ridge, Tenn.
V. C. Matijasevic, C.-B. Eom, T. H. Geballe. Stanford University, Stanford, Calif.
E. S. Hellman, E. H. Hartford. AT&T Bell Labs, Murray Hill, N. J.
- 709 *Thermodynamics of the Y-Ba-Cu-C-O-H System: Application to the Organometallic Chemical Vapor Deposition of the YBa₂Cu₃O_{7-x} Phase***
J. Am. Ceram. Soc. 75(10), pp. 2679-86 (1992)
C. Vahlas. Laboratoire Marcel Mathieu, France
T. M. Besmann. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 710 *Enhanced Current Density J_c in Single Crystal Bi₂Sr₂Ca₁Cu₂O₈ via Linear Defects from Heavy Ion Irradiation***
Bull. Am. Phys. Soc. 37, p. 172 (1992)
J. R. Thompson, H. R. Kerchner, D. K. Christen, B. C. Sales, B. C. Chakoumakos. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun, J. O. Thomson. University of Tennessee, Knoxville, Tenn.
L. Civale, A. D. Marwick. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 711 *Flex Creep Studies in Grain-Aligned YBa₂Cu₃O_{7- δ} vs Oxygen Deficiency δ***
Bull. Am. Phys. Soc. 37, p. 118 (1992)
J. R. Thompson, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. G. Ossandon, Y. R. Sun. University of Tennessee, Knoxville, Tenn.
- 712 *A Review of the XRD Data of the Phases Present in the CaO-SrO-PbO System***
Powder Diff. 7(2), pp. 96-98 (1992)
B. J. Reardon. Alfred University, Alfred, N. Y.
C. R. Hubbard. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 713 *Magnetization Studies of Irradiation Modified Single Crystal Y₁Ba₂Cu₃O₇ Superconductors: Flux Creep and Annealing Effects***
Physics and Materials Science of High Temperature Superconductors, II, pp. 573-93
(Dordrecht: Kluwer, 1992)
J. R. Thompson, D. K. Christen, H. R. Kerchner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
A. P. Malozemoff, L. Civale, A. D. Marwick, T. K. Worthington, L. Krusin-Elbaum, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 714 *Excess Heat Production in Composite Superconductors During Current Redistribution***
ORNL/TM-11827 (May 1991)
L. Dresner. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 715 The Structure and Chemistry of Grain Boundaries in Ceramic Superconductors**
Proceedings of the American Ceramic Society Second International Ceramic Science and Technology Congress, Orlando, Florida, November 12-15, 1990, 19, pp. 365-72 (Westerville, Ohio: American Ceramic Society, 1991)
K. B. Alexander, R. K. Williams, D. M. Kroeger, J. Brynestad. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 716 Reduced Flux Motion via Creep Annealing in High- J_c Single-Crystal $Y_1Ba_2Cu_3O_7$**
Appl. Phys. Lett. 59, pp. 2612-14 (1991)
J. R. Thompson, D. K. Christen, H. R. Kerchner. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun, J. G. Ossandon. University of Tennessee, Knoxville, Tenn.
A. P. Malozemoff, A. Marwick, F. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 717 Long-Term, Nonlogarithmic Magnetic Relaxation in Single-Crystal $YBa_2Cu_3O_7$ Superconductor**
Phys. Rev. B 44, pp. 458-61 (1991)
J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
F. H. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
- 718 Critical Current Enhancement by the Extended Vortex Confinement in $YBaCuO$ Single Crystals**
Bull. Am. Phys. Soc. 36, p. 669 (1991)
L. Civale, T. K. Worthington, L. Krusin-Elbaum, A. P. Malozemoff, F. Holtzberg, C. A. Feild. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. A. Kirk. Argonne National Laboratory, Argonne, Ill.
- 719 Vortex Confinement by Columnar Defects in $YBa_2Cu_3O_7$ Crystals: Enhanced Pinning at High Fields and Temperatures**
Phys. Rev. Lett. 67, pp. 648-51 (1991)
L. Civale, A. D. Marwick, T. K. Worthington, L. Krusin-Elbaum, F. H. Holtzberg. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
M. A. Kirk. Argonne National Laboratory, Argonne, Ill.
J. R. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. R. Sun. University of Tennessee, Knoxville, Tenn.
J. R. Clem. Iowa State University, Ames, Iowa
- 720 Critical Currents in Proton Irradiated $YBa_2Cu_3O_{7-\delta}$ Crystals**
Progress in High Temperature Superconductivity 31, pp. 25-43 (Singapore: World Scientific Publishing Co., 1991)
L. Civale, M. W. McElfresh, A. D. Marwick, T. K. Worthington, A. P. Malozemoff, F. Holtzberg, C. Feild. IBM Thomas J. Watson Research Center, Yorktown Heights, N. Y.
J. R. Thompson, D. K. Christen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. A. Kirk. Argonne National Laboratory, Argonne, Ill.

- 721 The Hardness and Young's Modulus of Bulk $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ (1:2:3) and $\text{YBa}_2\text{Cu}_4\text{O}_8$ (1:2:4) as Determined by Ultra Low Load Indentation**
J. Mater. Res. 6, pp. 2519–22 (1991)
B. N. Lucas. University of Tennessee, Knoxville, Tenn.
W. C. Oliver, R. K. Williams, J. Brynestad. Oak Ridge National Laboratory, Oak Ridge, Tenn.
M. E. O'Hern. Nano Instruments, Inc., Knoxville, Tenn.
- 722 Anisotropic Thermal Expansion of the 1:2:4 Yttrium Barium Copper Oxide Superconductors**
Physica C 172, pp. 486–90 (1991)
K. Doverspike, C. R. Hubbard, R. K. Williams, K. B. Alexander, J. Brynestad, D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 723 Some Observations of the Effects of High Pressures and Temperatures on the Stability of $\text{YB}_2\text{Cu}_3\text{O}_{7-x}$**
Journal of Applied Physics 67(11), pp. 6934–39 (1990)
R. K. Williams, K. B. Alexander, J. Brynestad, T. J. Henson, D. M. Kroeger, T. B. Lindemer, G. C. Marsh, J. O. Scarbrough. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 724 Superconductivity, Inter- and Intra-grain Critical Current Densities of $\text{Ti}_2\text{Ca}_2\text{Ba}_2\text{Cu}_3\text{O}_{10+x}$ and $\text{Ti}_2\text{CaBa}_2\text{Cu}_2\text{O}_{8+x}$ Materials**
Phys. Rev. B 39, pp. 6652–59 (April 1989)
J. R. Thompson, J. Brynestad, D. M. Kroeger, S. T. Sekula, D. K. Christen, E. D. Specht. Oak Ridge National Laboratory, Oak Ridge, Tenn.
Y. C. Kin. University of Tennessee, Knoxville, Tenn.
- 725 Grain Boundaries and Critical Current Density in High Temperature Oxide Superconductors**
Journal of Metals 41, pp. 14–17 (1989)
D. M. Kroeger. Oak Ridge National Laboratory, Oak Ridge, Tenn.

THERMAL ENERGY STORAGE

- 726 Thermal Energy Storage Technical Progress Report April 1992–March 1993**
ORNL/TM-12384 (May 1993)
M. Olszewski. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 727 Thermal Energy Storage Technical Progress Report April 1990–March 1991**
ORNL/TM-12081 (March 1992)
J. J. Tomlinson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 728 Development of a Complex Compound Chilli Storage System**
ORNL/Sub/85-57432/1 (August 1991)
U. Rockenfeller, L. Kirol. Rocky Research, Boulder City, Nev.
- 729 Turbo Refrigerating Company Ice Storage Test Report**
ORNL/TM-11657 (June 1991)
T. K. Stovall. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 730 Wallboard with Latent Heat Storage for Passive Solar Applications**
ORNL/TM-11541 (May 1991)
R. J. Kedl. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 731 Thermal Energy Storage Technical Progress Report April 1989–March 1990**
ORNL/TM-11819 (March 1991)
J. J. Tomlinson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 732 Development of Composite Latent/Sensible Heat Storage Media**
ORNL/Sub/86-95011/1 (December 1990)
R. Petri, E. T. Ong, A. Kardas. Institute of Gas Technology, Chicago, Ill.
- 733 Thermal Energy Storage**
Mechanical Engineering 112(9) (September 1990)
J. J. Tomlinson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
L. D. Kannberg. Battelle Pacific Northwest Laboratories, Richland, Wash.
- 734 Boiling/Evaporative Heat Transfer from Spheres in Packed-Bed Thermal Energy Storage Units. Final Report**
ORNL/Sub/86-7685/2 (May 1990)
R. V. Arimilli, C. A. Moy. University of Tennessee, Knoxville, Tenn.
- 735 Thermal Energy Storage Technical Progress Report April 1987–March 1988**
ORNL/TM-11233 (September 1989)
J. J. Tomlinson, R. J. Kedl. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 736 Development of Ice Self-Release Mechanisms. Final Report**
ORNL/Sub/87-SB064/1 (September 1989)
W. E. Stewart, Jr. University of Missouri-Columbia/Kansas City, Truman Campus, Independence, Mo.

- 737 Complex-Compound Low-Temperature TES System**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 217-36 (1989)
U. Rockenfeller. Rocky Research Corp., Boulder City, Nev.
- 738 Preliminary TES Design Optimization Study for a Simple Periodic Brick Plant**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 197-207 (1989)
J. B. Drake, M. Olszewski, M. J. Taylor, J. J. Tomlinson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
A. D. Solomon. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 739 Thermal Energy Storage with Liquid-Liquid Systems**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 146-70 (1989)
E. A. Santana, L. I. Stiel. New York Polytechnic Institute, Brooklyn, N.Y.
- 740 Self-Releasing Submerged Ice Maker**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 128-45 (1989)
W. E. Stewart, Jr., M. E. Greer, L. A. Stickler. University of Missouri-Columbia/Kansas City, Truman Campus, Independence, Mo.
- 741 Computer and Graphics Modeling of Heat Transfer and Phase Change in a Wall with Randomly Imbibed PCM**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 124-27 (1989)
A. D. Solomon. Consultant to Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 742 Development of PCM Wallboard for Heating and Cooling of Residential Buildings**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 97-123 (1989)
I. Salyer, A. Sircar. University of Dayton Research Institute, Dayton, Ohio
- 743 Development of a Direct Contact Ice Storage System**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 93-96 (1989)
C. Poirier. CBI Industries, Plainfield, Ill.
- 744 Effects of Dopants on Crystal Structure and Thermal Properties of Pentaglycerine**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 58-75 (1989)
D. Chandra, W. Ding. University of Nevada, Reno, Nev.
- 745 Evaporative Heat Transfer in Beds of Sensible Heat Pellets**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 26-57 (1989)
R. V. Arimilli, C. A. Moy. University of Tennessee, Knoxville, Tenn.
- 746 Overview of the Diurnal and Industrial Thermal Energy Storage Programs**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 19-25 (1989)
J. J. Tomlinson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 747 Activities in Support of the Wax-Impregnated Wallboard Concept**
U.S. Department of Energy Thermal Energy Storage Research Activities Review 1989
Proceedings, CONF-890351, pp. 75-91 (1989)
R. J. Kedl, T. K. Stovall. Oak Ridge National Laboratory, Oak Ridge, Tenn.

BIOFUELS FEEDSTOCK DEVELOPMENT

- 748 **Nitrogen Fertilization Strategies in a Short-Rotation Sycamore Plantation**
Forest Ecology and Management 64(1), pp. 14-24 (March 1994)
 H. Van Miegroet, R. J. Norby, T. J. Tschaplinski. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 749 **Water Stress Tolerance of Black and Eastern Cottonwood Clones and Four Hybrid Progeny. I. Growth, Water Relations and Gas Exchange**
Canadian Journal of Forest Research 24(2), p. 364 (February 1994)
 T. J. Tschaplinski, G. A. Tuskan, C. A. Gunderson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 750 **Anatomical Considerations Related to Photosynthesis in Cotton (*Gossypium hirsutum* L.) Leaves, Bracts, and the Capsule Wall**
Journal of Experimental Botany 45(270), p. 111 (January 1994)
 B. R. Bondada, D. M. Oosterhuis, K. S. Kim, W. M. Harris. University of Arkansas, Fayetteville, Ark.
 S. D. Wulschleger. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 751 **Energy in Synthetic Fertilizers and Pesticides: Revisited**
 ORNL/Sub/90-99732/2 (January 1994)
 M. G. Bhat, B. C. English. University of Tennessee, Knoxville, Tenn.
 A. F. Turhollow, H. O. Nyangito. Consultants to Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 752 **Biomass Production by Fescue and Switchgrass Alone and in Mixed Swards with Legumes**
 ORNL/M-3312 (January 1994)
 M. Collins. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 753 **Short Rotation Woody Crop Trials for Energy Production in North Central U.S. 1992 Annual Report**
 ORNL/M-3220 (January 1994)
 E. Hansen, D. Netzer, E. Tolsted, M. Ostry. North Central Forest Experiment Station, Grand Rapids, Minn.

- 754 **ORNL's Biofuels Feedstock Information Resources**
Biologue 11, pp. 35-38 (1993)
 A. R. Ehrenshaft, L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 755 **Considerations in Implementing Integrated Biomass Energy Systems in Developing Countries**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
 R. D. Perlack, J. W. Ranney. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 756 **Biomass Resource Potential Using Energy Crops**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
 L. L. Wright, J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 S. A. Martin. Midwest Technical Inc., Knoxville, Tenn.

- 757 Evaluating a Biomass Resource: The TVA Region-Wide Biomass Resource Assessment Model**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
M. Downing, R. L. Graham. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 758 The Role of Natural Resource and Environmental Economics in Determining the Trade-Offs in Consumption and Production of Energy Inputs: The Case of Biomass Energy Crops**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
M. Downing, R. L. Graham. Oak Ridge National Laboratory, Oak Ridge, Tenn. ;
- 759 Renewable Biomass Energy: Understanding Regional Scale Environmental Impacts**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
M. Downing, R. L. Graham. Oak Ridge National Laboratory, Oak Ridge, Tenn. ;
- 760 Environmental Issues Related to Biomass: An Overview**
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
M. Hughes. U.S. Department of Agriculture, Washington, D. C.
J. W. Ranney. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 761 Growing Populus Biomass: Comparison of Woodgrass versus Wider-Spaced Short-Rotation Systems**
Biomass Bioenergy 4(5), pp. 305–13 (1993)
D. S. DeBell, G. W. Clendenen, J. C. Zasada. USDA Forest Service, Pacific Northwest Station, Portland, Ore.
- 762 Biofuels Feedstock Development Program Annual Progress Report for 1992**
ORNL-6781 (November 1993)
L. L. Wright, J. H. Cushman, A. R. Ehrenshaft, S. B. McLaughlin, S. A. Martin, W. A. McNabb, J. W. Ranney, G. A. Tuskan, A. F. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 763 U.S. Carbon Offset Potential Using Biomass Energy Systems**
Water, Air, & Soil Pollution 70(1/4), p. 483 (October 1993)
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
E. E. Hughes. Electric Power Research Institute, Palo Alto, Calif.
- 764 Physiological Indicators of Nitrogen Response in a Short Rotation Sycamore Plantation. II. Nitrogen Metabolism**
Canadian Journal of Botany 71, pp. 841–47 (June 1993)
T. J. Tschaplinski, R. J. Norby. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 765 Variability for Biomass Production and Plant Composition in Sericea Lespedeza Germplasm, Final Report on a Field and Laboratory Research Program for the Period September 30, 1990, to December 31, 1991**
ORNL/Sub/90-SG301/1 (May 1993)
J. A. Mosjidis. Auburn University, Auburn, Ala.
- 766 Realized and Potential Value of Genetics and Biotechnology for Biofuel Feedstock Improvement**
pp. 107–109 in *Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992* P-265 (Warrendale, Pa.: Society of Automotive Engineers, Inc., May 1993)
G. A. Tuskan. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 767 New Switchgrass Biofuels Research Program for the Southeast**
pp. 111–15 in *Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1992* P-265 (Warrendale, Pa.: Society of Automotive Engineers, Inc., May 1993)
S. B. McLaughlin. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 768 Clonal and Leaf Age Variation in Populus Phenolic Glycosides: Implications for Host Selection by Chrysomela scripta (Coleoptera: Chrysomelidae)**
Environmental Entomology 22(2), pp. 397–403 (April 1993)
B. R. Bingaman, E. R. Hart. Iowa State University, Ames, Iowa
- 769 Genetic Improvement and Evaluation of Black Cottonwood for Short Rotation Biomass Production, Progress Report for the Period 1987 to 1992**
ORNL/Sub/83-43382/8 (April 1993)
R. F. Stettler, T. M. Hinckley, P. E. Heilman, H. D. Bradshaw, Jr. University of Washington, Seattle, Wash.
- 770 Perennial Species for Optimum Production of Herbaceous Biomass in the Piedmont (Management Study, 1987–1991)**
ORNL/Sub/85-27413/7 (April 1993)
D. J. Parrish, D. D. Wolf, W. L. Daniels. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 771 Biochemical and Molecular Bases of Water Stress Tolerance in Populus Annual Progress Report**
ORNL/M-3222 (April 1993)
T. J. Tschaplinski, G. A. Tuskan. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 772 Genetic Biomass and Growth Analysis of Clonal Silver Maple (Acer saccharinum L.) in Several Locations**
ORNL/Sub/86-95908/5 (March 1993)
J. E. Preece, W. C. Ashby, C. A. Huetteman, P. L. Roth. Southern Illinois University, Carbondale, Ill.
- 773 Selection and Breeding of Pest-Resistant Clones of Populus for Biomass Energy Production in the North Central Region, 1993 Update, Program Growth and Yield (1988–95 Growing Seasons)**
ORNL/Sub/88-43391/7 (March 1993)
R. B. Hall, R. C. Schultz, E. R. Hart, H. S. McNabb. Iowa State University, Ames, Iowa

- 774 Selection and Breeding of Pest-Resistant Clones of Populus for Biomass Energy Production in the North Central Region, Annual Report for the Period 1 January 1992–31 December 1992**
ORNL/Sub/88-43391/6 (February 1993)
R. B. Hall, R. D. Hanna, B. G. McMahon, E. R. Hart, H. S. McNabb. Iowa State University, Ames, Iowa
- 775 Screening Alnus for Resistance to Fenusa dohrnii**
pp. 116–25 in *Proceedings Alder Workshop: August 8–9, 1988, Vancouver, B. C.* (Ames, Iowa: Iowa State University Printing Service, 1993)
R. B. Hall, E. R. Hart, C. S. Duncan. Iowa State University, Ames, Iowa
- 776 Responses of Loblolly Pine Seedlings to Elevated CO₂ and Fluctuating Water Supply**
Tree Physiol. **13**, pp. 283–96 (1993)
T. J. Tschaplinski, R. J. Norby, S. D. Wullschlegel. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 777 Intraspecific Variation in Photosynthetic Traits of Populus trichocarpa**
Canadian Journal of Botany **71**, pp. 1304–11 (1993)
J. M. Dunlap, J. H. Braatne, T. M. Hinckley, R. F. Stettler. University of Washington, Seattle, Wash.
- 778 Further Considerations on the Debate Over Herbivore Optimization Theory**
Ecol. Appl. **3**(1), pp. 30–31 (1993)
D. L. DeAngelis, M. A. Huston. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 779 Atmospheric Deposition, Forest Nutrient Status, and Forest Decline: Implications of the Integrated Forest Study**
pp. 66–81 in *Proceedings of Conference on Forest Decline in the Atlantic and Pacific Region, Hilo, Hawaii, June 2–6, 1991* (New York: Springer-Verlag, 1993)
D. W. Johnson. Desert Research Institute, Reno, Nev.
S. E. Lindberg, H. Van Miegroet. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. M. Lovett. Cary Arboretum, Milbrook, N. Y.
D. W. Cole. University of Washington, Seattle, Wash.
M. J. Mitchell. State University of New York, Syracuse, N. Y.
D. Binkley. Colorado State University, Fort Collins, Colo.
- 780 Possible Reduction of Atmospheric CO₂ by Iron Fertilization in the Antarctic Ocean**
pp. 263–85 in *Geophysical/Geochemical Aspects of Global Warming* (Boca Raton, Fla.: CRC Press, 1993)
T.-H. Peng. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 781 Thidiazuron: A Potent Cytokinin for Woody Plant Tissue Culture**
Plant Cell Tissue and Organ Culture **33**, pp. 105–19 (1993)
C. A. Huetteman, J. E. Preece. Southern Illinois University, Champagne, Ill.
- 782 Carbon Allocation Terminology: Should It Be More Rational?**
Bulletin of the Ecological Society of America **74**, pp. 175–77 (1993)
R. E. Dickson, J. G. Isebrands. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.

- 783 Production Physiology and Morphology of Populus Species and Their Hybrids Grown Under Short Rotation. I. Clonal Comparisons of 4-year Growth and Phenology**
Canadian Journal of Forest Research 22(12), p. 1937 (December 1992)
R. J. Ceulemans, G. Scarascia-Mugnozza, B. M. Wiard, J. H. Braatne, T. M. Hinckley, R. F. Stettler, P. E. Heilman. University of Washington, Seattle, Wash.
J. G. Isebrands. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.
- 784 Biofuels Feedstock Development Program Annual Progress Report for 1991**
ORNL-6742 (July 1992)
L. L. Wright, J. H. Cushman, A. R. Ehrenshaft, S. B. McLaughlin, W. A. McNabb, J. W. Ranney, G. A. Tuskan, A. F. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 785 Environmental Emissions and Socioeconomic considerations in the Production, Storage, and Transportation of Biomass Energy Feedstocks**
ORNL/TM-12030 (July 1992)
R. D. Perlack, J. W. Ranney, L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 786 Development of Biomass Energy Crops**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 687-89 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
L. L. Wright, J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 787 Genetic Improvement of Hybrid Poplars for Short Rotation Biomass Production**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 691-92 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
R. F. Stettler, T. M. Hinckley, H. D. Bradshaw, Jr. University of Washington, Seattle, Wash.
P. E. Heilman. Washington State University, Seattle, Wash.
- 788 Selection and Breeding of Pest-Resistant Clones of Populus for Biomass Energy Production in the North Central Region**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 693-702 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
R. B. Hall, E. R. Hart, H. S. McNabb, Jr., B. G. McMahon, R. D. Hanna. Iowa State University, Ames, Iowa
- 789 Biofuels Feedstock Production Research Directions for 1992**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 703-707 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 790 Selection of Herbaceous Energy Crops for Production in Double Cropping Systems**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 709-12 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
D. R. Buxton, I. C. Anderson. Iowa State University, Ames, Iowa

- 791 Short Rotation Woody Crop Trials for Energy Production in North Central U.S.**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting 1991 P-256, pp. 715–16 (Warrendale, Pa.: Society of Automotive Engineers, June 1992)
E. A. Hansen. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.
- 792 The Structure and Dynamics of Woody Plant Root Systems**
pp. 95–123 in *Ecophysiology of Short Rotation Forest Crops*, ed. C. P. Mitchell et al. (New York: Elsevier Applied Science, 1992)
D. I. Dickmann, K. S. Pregitzer. Michigan State University, East Lansing, Mich.
- 793 Ecophysiological Growth Process Models of Short-Rotation Forest Crops**
pp. 231–66 in *Ecophysiology of Short Rotation Forest Crops*, ed. C. P. Mitchell et al. (New York: Elsevier Applied Science, 1992)
J. G. Isebrands, T. E. Burk. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.
- 794 Variation Among Switchgrasses from Remanent Prairies for Agronomic and Biofuel Traits**
Agronomy Abstracts, p. 202 (1992)
A. A. Hopkins. Oklahoma State University, Stillwater, Okla.
K. P. Vogel. University of Nebraska, Lincoln, Neb.
K. J. Moore, K. J. Johnson, I. T. Carlson. Iowa State University, Ames, Iowa
- 795 Environmental Considerations in Biomass Resource Management for a Greenhouse-Constrained Society**
Technologies for a Greenhouse-Constrained Society, ed. M. A. Kuliasha, A. Zucker, and K. J. Ballew, pp. 519–45 (Chelsea, Mich.: Lewis Publishers, Inc., 1992)
J. W. Ranney. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 796 Photosynthesis, Water Relations, and Growth of Two Hybrid Populus Genotypes During a Severe Drought**
Can. J. For. Res. 22(8), pp. 1094–1106 (1992)
D. I. Dickmann, Z. Liu, P. V. Nguyen, K. S. Pregitzer. Michigan State University, East Lansing, Mich.
- 797 Nursery Establishment, Phenology and Growth of Silver Maple Related to Provenance**
Biomass and Bioenergy 3, pp. 1–7 (1992)
W. C. Ashby, D. F. Bresnan, P. L. Roth, J. E. Preece, C. A. Huetteman. Southern Illinois University, Champagne, Ill.
- 798 Genetic Variation and Productivity of Populus trichocarpa T. & G. and Its Hybrids: V. The Influence of Ramet Position on Three-Year Growth Variables**
Can. J. For. Res. 23, pp. 349–57 (1992)
J. D. Dunlap, R. F. Stettler. University of Washington, Seattle, Wash.
P. E. Heilman. Washington State University, Puyallup, Wash.
- 799 Environmental and Genetic Influences on Short-Rotation Biomass Production of Black Locust (Robinia pseudoacacia L.) in the Georgia Piedmont**
For. Ecol. Manag. 55, pp. 315–31 (1992)
B. C. Bongarten, D. A. Huber, D. K. Apsley. University of Georgia, Athens, Ga.

- 800 Genetic and Physiological Investigations of Seedling Development and Steckling Growth for American Sycamore (*Platanus occidentalis* L.)**
Doctoral dissertation, Mississippi State University, 1992
Z. Tang. Mississippi State University, Mississippi State, Miss.
- 801 Biomass Energy Development in Yunnan Province, China. Preliminary Evaluation**
ORNL/TM-11791 (June 1991)
R. D. Perlack, J. W. Ranney, M. Russell. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 802 Development of a Farm-Firm Modelling System for Evaluation of Herbaceous Energy Crops**
ORNL/Sub/88-SC616/2 (March 1991)
B. C. English, R. R. Alexander, K. H. Loewen, S. A. Coady, G. V. Cole, W. R. Goodman. Department of Agricultural Economics and Rural Sociology, University of Tennessee, Knoxville, Tenn.
- 803 Chilling and Bud Break in Silver Maple**
J. Environ. Hort. 9, pp. 1-4 (1991)
W. C. Ashby, D. F. Bresnan, C. A. Huetteman, J. E. Preece, P. L. Roth. Southern Illinois University, Champagne, Ill.
- 804 Registration of 'Rebel' Rapeseed**
Crop Sci. 31, pp. 485-86 (1991)
D. L. Auld, K. A. Mahler, D. C. Thrill, D. A. Erickson, P. L. Raymer, D. C. Bridges, J. L. Butler. University of Idaho, Moscow, Idaho
- 805 Registration of Two Rapeseed Germplasm Populations**
Crop Sci. 31, pp. 493-94 (1991)
D. L. Auld, K. A. Mahler, D. C. Thrill, D. A. Erickson, P. L. Raymer, J. L. Sernyk. University of Idaho, Moscow, Idaho
- 806 Biomass Energy: Exploring the Risks of Commercialization in the United States of America**
Bioresource Technology 35, pp. 1-13 (1991)
R. A. Cantor, C. G. Rizy. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 807 Land Application of Sludge to Forest and Herbaceous Energy Crops**
Ames Forester, pp. 24-30 (1991)
J. P. Colletti, C. Mize, D. Schultz, L. Rule, A. Skadberg, R. Hall, P. Wray. Iowa State University, Ames, Iowa
- 808 Agroforestry Systems for the Midwest**
Ames Forester, pp. 10-13 (1991)
J. P. Colletti, L. Rule, A. Skadberg, D. Schultz, C. Mize, R. Hall, P. Wray. Iowa State University, Ames, Iowa
- 809 Selecting Herbaceous Energy Crops for the Southeast and Midwest/Lake States**
Energy from Biomass and Wastes XIV, ed. D. L. Klass, pp. 465-480 (Chicago, Ill.: Institute of Gas Technology, 1991)
J. H. Cushman, A. F. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 810 Leaves as Regulators of Stress Response**
Response of Plants to Multiple Stresses, ed. H. A. Mooney et al., pp. 3-34 (San Diego, Calif.: Academic Press, Inc., 1991)
R. E. Dickson, J. G. Isebrands. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.
- 811 The Short Rotation Woody Crops Program Data Base**
Bioresource Technology 36, pp. 241-246 (1991)
A. R. Ehrenshaft, L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 812 Biomass Crop Production on Representative Southeastern U.S. Farms: Farm Profitability, Erosion Control and the 1985 Food Security**
ActBioresource Technology 36, pp. 207-214 (1991)
W. R. Goodman, S. A. Coady, B. C. English. University of Tennessee, Knoxville, Tenn.
- 813 Dormancy Induction Treatment Influence on Western Hemlock Seedlings. I. Seedling Development and Stock Quality Assessment**
Can. J. For. Sci. 21, pp. 164-174 (1991)
S. C. Grossnickle, J. T. Arnott, J. E. Major, T. J. Tschaplinski. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 814 Activity of the Fenusa dohrnii (Hymenoptera: tenthredinidae) on Alnus in the Northcentral United States**
Environ. Entomol. 20, pp. 534-539 (1991)
E. R. Hart, D. G. Petty, R. B. Hall, D. A. Herms, R. D. Hanna, J. N. Kean. Iowa State University, Ames, Iowa
- 815 Dispersal of Fenusa dohrnii (Hymenoptera: tenthredinidae) from an Alnus Short-Rotation Forest Plantation**
Great Lakes Entomologist 24, pp. 63-68 (1991)
E. R. Hart, R. B. Hall, R. D. Hanna, Iowa State University, Ames, Iowa
- 816 Effects of Nitrate on In vitro Nitrate Reductase Activity of Seedlings from Three Open-Pollinated Families of Robinia pseudoacacia**
Tree Physiology 8, pp. 381-389 (1991)
K. H. Johnson, B. C. Bongarten, L. R. Boring. University of Georgia, Athens, Ga.
- 817 Fuel Ethanol from Cellulosic Biomass**
Science 251, pp. 1318-1323 (1991)
L. R. Lynd. Thayer School of Engineering, Dartmouth College, Hanover, N. H.
J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. J. Nichols. Ford Motor Company, Dearborn, Mich.
C. E. Wyman. National Energy Research Laboratory, Golden, Colo.
- 818 Biological Markers in Animals and Plants to Establish Exposure to, and Effects of, Atmospheric Toxicants**
Ecological Exposure and Effects of Airborne Toxic Chemicals: An Overview, ed. T. J. Moser, J. R. Baker, and D. T. Tingey, pp. 107-127 (Corvallis, Ore.: U.S. Environmental Protection Agency, 1991)
J. F. McCarthy, T. J. Tschaplinski. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 819 Disease and Insect Resistance: A Key to Successful Short Rotation Woody Crops Systems**
Ames Forester 78, pp. 31-33 (1991)
H. S. McNabb, Jr., E. R. Hart, R. B. Hall. Iowa State University, Ames, Iowa

- 820 A Field Trial of Transgenic Hybrid Poplar Trees: Establishment and Growth Through The Second Season**
Biological Monitoring of Genetically Engineered Plants and Microbes, ed. D. R. MacKenzie and S. C. Henry, pp. 155–159 (Bethesda, Md.: Agricultural Research Institute, 1991)
H. S. McNabb, Jr., N. B. Klopfenstein, R. D. Hanna, R. B. Hall, E. R. Hart, S. A. Heuchelin, R. W. Thornbur. Iowa State University, Ames, Iowa
- 821 A Five-Year Study of Herbaceous Energy Crops**
Proc., Energy from Biomass and Wastes XIV, ed. D. L. Klass, pp. 447–464 (Chicago, Ill.: Institute of Gas Technology, 1991)
D. J. Parrish, D. D. Wolf, W. L. Daniels, J. S. Cundiff, D. H. Vaughan. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 822 Micro- and Cutting Propagation of Silver Maple. I. Results with Adult and Juvenile Propagules**
J. Amer. Soc. Hort. Sci. 116, pp. 142–148 (1991)
J. E. Preece, C. A. Huetteman, W. C. Ashby, P. L. Roth. Southern Illinois University, Champagne, Ill.
- 823 Energy from Biomass**
The Energy Sourcebook: a Guide to Technology, Resources and Policy, pp. 299–311 (New York: American Institute of Physics, 1991)
J. W. Ranney, J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 824 Carbon Storage and Recycling in Short-Rotation Energy Crops**
Proc., Bioenergy and the Greenhouse Effect, ed. C. P. Mitchell, pp. 39–60 (Stockholm, Sweden: International Energy Agency and National Energy Administration of Sweden, 1991)
J. W. Ranney, L. L. Wright, C. P. Mitchell. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 825 Woody Biomass Production Costs In the United States: An Economic Summary of Commercial Populus Plantation Systems**
Proc., Energy from Biomass and Wastes XIV, ed. D. L. Klass, pp. 359–369 (Chicago, Ill.: Institute of Gas Technology, 1991)
C. H. Strauss. Pennsylvania State University, University Park, Pa.
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 826 Influence of Timing and Method of Harvest on Rapeseed Yield**
J. Production Agriculture 4, pp. 266–272 (1991)
D. L. Thomas, M. A. Breve, P. L. Raymer. University of Georgia, Athens, Ga.
- 827 Biomass and Soil Nitrogen Relationships of a One-Year-Old Sycamore Plantation**
Soil Sci. Am. J. 55, pp. 841–847 (1991)
T. J. Tschaplinski, R. J. Norby, D. E. Todd. Oak Ridge National Laboratory, Oak Ridge, Tenn.
D. W. Johnson. Desert Research Institute, Reno, Nev.
- 828 Physiological Indicators of Nitrogen Response in Short Rotation Sycamore Plantations. I. CO₂ Assimilation, Photosynthetic Pigments, and Soluble Carbohydrates**
Physiol. Plant. 82, pp. 117–126 (1991)
T. J. Tschaplinski, R. J. Norby. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 829 Screening Herbaceous Lignocellulosic Energy Crops in Temperate Regions of the United States**
Bioresource Technology 36, pp. 247-252 (1991)
A. F. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 830 Windbreak Species Performance and Management Practices as Reported by Montana and North Dakota Landowners**
J. Soil and Water Conservation May-June, pp. 225-228 (1991)
G. A. Tuskan. Oak Ridge National Laboratory, Oak Ridge, Tenn.
K. Laughlin. University of Idaho, Sandpoint, Idaho
- 831 Role of New Wood Energy Crops in Mitigation of Fossil CO₂ Emissions**
Proc., 1990 Conference on Biomass for Utility Applications, pp. 87-112 (Palo Alto, Calif.: Electric Power Research Institute, 1991)
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 832 The Economic Viability of Short Rotation Woody Crops**
Policy Implications of Greenhouse Warming Report of the Mitigation Panel. Appendix H: Biomass, pp. H-1-H-7 (Washington, D. C.: National Academy Press, 1991)
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 833 Herbaceous Energy Crops Program: Annual Progress Report for FY 1988**
ORNL-6639 (November 1990)
A. F. Turhollow, J. H. Cushman, J. W. Johnston. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 834 Screening of Herbaceous Species for Energy Crop Production. Final Report 1985-1990**
ORNL/Sub/85-27411/5 (November 1990)
N. Wright. Geophyta, Vickery, Ohio
- 835 Evaluation of Potential Herbaceous Biomass Crops on Marginal Crops Lands: 2) Economic Potential. Final Report 1985-1989**
ORNL/Sub/85-27412/5&P2 (November 1990)
C. L. Dobbins, P. Preckel, A. Mdafri, J. Lowenberg-DeBoer, D. Stucky. Purdue University, West Lafayette, Ind.
- 836 Screening and Selection of Herbaceous Species for Biomass Production in the Midwest/Lake States. Final Report 1985-1989**
ORNL/Sub/85-27410/5 (November 1990)
R. A. Pfeifer, G. W. Fick, D. J. Lathwell, C. Maybee. New York State College of Agriculture and Life Sciences, Cornell University, Ithaca, N.Y.
- 837 Short Rotation Woody Crops Program: Annual Progress Report for 1989**
ORNL-6625 (August 1990)
L. L. Wright, A. R. Ehrenshaft. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 838 Modifying Woody Plants for Efficient Conversion to Liquid and Gaseous Fuels**
ORNL/Sub/88-SC006/1 (July 1990)
R. J. Dinus, D. R. Dimmel, R. P. Feirer, M. A. Johnson, E. W. Malcolm. Institute of Paper Science and Technology, Atlanta, Ga.

- 839 Evaluation of Potential Herbaceous Biomass Crops on Marginal Crop Lands: 1) Agronomic Potential. Final Report 1985-1989**
ORNL/Sub/85-27412/5&P1 (July 1990)
J. H. Cherney, K. D. Johnson, J. J. Volenec, E. J. Kladvko, D. K. Greene. Department of Agronomy, Purdue Univ., West Lafayette, Ind.
- 840 Evaluation of the Potential for Using Old-Field Vegetation as an Energy Feedstock: Biomass Yield, Chemical Composition, Environmental Concerns, and Economics**
ORNL/TM-11615 (July 1990)
J. W. Johnston, Jr. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 841 Selection and Improvement of Herbaceous Energy Crops for the Southeastern USA. Final Report on a Field and Laboratory Research Program for the Period March 15, 1985 to March 14, 1990**
ORNL/Sub/85-27409/5 (July 1990)
D. I. Bransby, S. E. Sladden, D. D. Kee. Dept. of Agronomy and Soils, Auburn University, Auburn University, Ala.
- 842 Perennial Species for Optimum Production of Herbaceous Biomass in the Piedmont. Final Report 1985-1989**
ORNL/Sub/85-27413/5 (July 1990)
D. J. Parrish, D. D. Wolf, W. L. Daniels, D. H. Vaughan, J. S. Cundiff. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 843 Improving Rapeseed Production Practices in the Southeastern United States**
ORNL/Sub/86-91324/1 (April 1990)
D. L. Thomas, M. A. Breve, P. L. Raymer, N. A. Minton, D. R. Sumner. University of Georgia, Coastal Plain Experiment Station, Tifton, Ga.
- 844 CO₂ Emissions from Production and Combustion of Fuel Ethanol from Corn**
ORNL/TM-11180 (May 1990)
G. Marland, A. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 845 International Transfer of Agnus, Populus, and Cellos**
Biomass 22, pp. 49-62 (1990)
A. Ager, N. E. Nordh, S. Ledin, M. Ostry, M. Carlson, A. Ronnberg-Wastljung. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 846 Mechanization of the Operational Aspects of Short-Rotation Forestry**
Biomass 22, pp. 123-33 (1990)
N. S. Christopherson, J. A. Mattson. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 847 Chemical Control of Adventitious Root Formation in Cuttings**
PGRSA Quarterly 18, pp. 1-17 (1990)
T. D. Davis, B. E. Haissig. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 848 Evaluation of Agnus Species and Hybrids**
Biomass 22, pp. 21-34 (1990)
R. B. Hall, D. Burgess. Iowa State University, Ames, Iowa

- 849 Genetic Variation and Productivity of Populus trichocarpa and Its Hybrids. IV. Performance in Short-Rotation Coppice**
Can. J. For. Res. **20**, pp. 1257–64 (1990)
P. E. Heilman. Washington State University, Puyallup, Wash.
R. F. Stettler. University of Washington, Seattle, Wash.
- 850 Validating the Regional Applicability of a Whole-Plant Ecophysiological Growth Process Model of Juvenile Poplar**
Proceedings, Forest Simulation Systems, ed. L. C. Wensel and G. S. Biging, pp. 97–106 (University of California, 1990)
G. E. Host, H. M. Rauscher. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 851 Fuel Ethanol from Cellulosic Biomass**
Science **251**, pp. 1318–23 (1990)
L. R. Lynd. Thayer School of Engineering, Dartmouth College, Hanover, N.H.
J. H. Cushman. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. J. Nichols. Ford Motor Company, Dearborn, Mich.
C. E. Wyman. Solar Energy Research Institute, Golden, Colo.
- 852 The Microcomputer Scientific Series #6: The ECOPHYS User's Manual**
General Technical Report NC-141 (St. Paul, Minn.: U.S. Forest Service, North Central Forest Experiment Station, 1990)
G. E. Host, H. M. Rauscher, J. G. Isebrands, R. E. Dickson, T. R. Crow, D. A. Michael. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
D. I. Dickmann. Michigan State University, East Lansing, Mich.
- 853 Accelerating Energy Crop Growth via Genetic Techniques**
Energy from Biomass and Wastes XIII, pp. 397–424 (Chicago: Institute of Gas Technology, 1990)
P. A. Layton, L. L. Wright, T. W. Doyle, J. W. Ranney, J. H. Cushman, A. F. Turhollow. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 854 Economic Evaluations of Optimum Rotation Age for SRIC Plantations**
Energy from Biomass and Wastes XIII, pp. 295–307 (Chicago: Institute of Gas Technology, 1990)
C. H. Strauss, S. C. Grado, P. R. Blankenhorn, T. W. Bowersox. The Pennsylvania State University, University Park, Pa.
- 855 Commercialization of Short-Rotation Intensive Culture Tree Production in North America**
Energy from Biomass and Wastes XIII, pp. 309–29 (Chicago: Institute of Gas Technology, 1990)
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 856 ATP Concentrations in Pinus banksiana Cuttings During Adventitious Rooting**
J. Plant Physiol. **136**, pp. 499–502 (1990)
B. E. Haissig. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 857 Reduced Irradiance and Applied Auxin Influence Carbohydrate Relations in Pinus banksiana Cuttings During Propagation**
Physiologia Plantarum **78**, pp. 455–61 (1990)
B. E. Haissig. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.

- 858 Photosynthesis Patterns During the Establishment Year Within two Populus Clones**
Tree Physiology 6, pp. 11-27 (1990)
D. A. Michael, J. G. Isebrands, N. D. Nelson. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
D. I. Dickmann. Michigan State University, East Lansing, Mich.
- 859 Minimizing Disease Injury to Hybrid Poplars**
J. Environ. Hort. 8, pp. 96-98 (1990)
M. E. Ostry. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
H. S. McNabb, Jr. Iowa State University, Ames, Iowa
- 860 Cost Parameters Affecting Multiple Rotation SRIC Biomass Systems**
Appl. Biochem. Biotech. 24/25, pp. 721-33 (1990)
C. H. Strauss, S. C. Grado, P. R. Blankenhorn, T. W. Bowersox. The Pennsylvania State University, University Park, Pa.
- 861 Woody Biomass Production Costs in the United States: An Economic Summary of Commercial Populus Plantation Systems**
Solar Energy 45, pp. 105-10 (1990)
C. H. Strauss. The Pennsylvania State University, University Park, Pa.
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 862 A Review of Biomass Quality Research Relevant to the Use of Poplar and Willow for Energy Conversion**
Biomass 21, pp. 163-88 (1990)
W. A. Kenney. University of Toronto, Ontario, Canada
L. Sennerby-Forsse. Swedish University of Agricultural Sciences, Uppsala, Sweden
P. A. Layton. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 863 Economic Evaluations for Short-Rotation Biomass Production Systems**
Biomass 22, pp. 135-44 (1990)
D. C. Lothner. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
- 864 Coppicing Success of Young Eucalyptus saligna in Hawaii**
Biomass 23, pp. 137-48 (1990)
T. W. Bowersox. The Pennsylvania State University, University Park, Pa.
T. H. Schubert, R. F. Strand. USDA Forest Service, Pacific Northwest Forest Experiment Station, Portland, Ore.
C. D. Whitesell. BioEnergy Development Corp., Hilo, Hawaii
- 865 National Winter Rapeseed Variety Trial 1988-89**
Miscellaneous Series No. 130 (Moscow, Idaho: University of Idaho, 1990)
K. A. Mahler, D. L. Auld, comps. University of Idaho, Moscow, Idaho
- 866 Biotechnology in Biomass Crop Production. The Relationship of Biomass Production and Plant Genetic Engineering**
ORNL/M-978 (December 1989)
D. E. Harry. University of Illinois Urbana-Champaign, Urbana, Ill.
R. R. Sederoff. North Carolina State University, Raleigh, N.C.

- 867 Short Rotation Woody Crops Program: Annual Progress Report for 1988**
ORNL-6594 (October 1989)
L. L. Wright, T. W. Doyle, P. A. Layton, J. W. Ranney. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 868 Improved Conversion of Herbaceous Biomass to Biofuels: Potential for Modification of Key Plant Characteristics. Final Report on a Literature Review and Survey**
ORNL/Sub/88-SC011/1 (October 1989)
S. E. Sladden, D. I. Bransby. Auburn University, Auburn, Ala.
- 869 The SRWCP Database Management System: Users Guide, Data Definitions, and Source Code**
ORNL/TM-10820 (February 1989)
A. R. Ehrenshaft, L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 870 Short Rotation Woody Crops Program Publications and Presentations**
ORNL/TM-10848 (February 1989)
A. R. Ehrenshaft. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 871 Herbaceous Energy Crops Program: Annual Progress Report for FY 1987**
ORNL-6514 (January 1989)
J. H. Cushman, A. F. Turhollow, J. W. Johnston. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 872 Quick Estimates of Root Length, Using a Video Image Analyzer**
Canadian Journal of Forest Research 19, pp. 335-40 (1989)
M. Cunningham. University of Tennessee, Knoxville, Tenn.
M. B. Adams, R. J. Luxmoore, W. M. Post, D. L. DeAngelis. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 873 No-Till Establishment of Perennial, Warm-Season Grasses for Biomass Production**
Biomass 20, pp. 209-17 (1989)
D. D. Wolf, D. J. Parrish, W. L. Daniels, J. R. McKenna. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 874 Herbaceous Crops on Marginal Sites Erosion and Economics**
Biomass 29, pp. 199-208 (1989)
D. H. Vaughan, J. S. Cundiff, D. J. Parrish. Virginia Polytechnic Institute and State University, Blacksburg, Va.
- 875 Allozyme Variation in Black Locust (*Robinia pseudoacacia*)**
Can. J. For. Research 19, pp. 471-79 (1989)
S. E. Surles, J. L. Hamrick, B. C. Bongarten. University of Georgia, Athens, Ga.
- 876 Shoot Culture Dynamics of Six Populus Clones**
Tree Physiology 5, pp. 219-27 (1989)
J. C. Sellmer, B. E. Haissig. USDA Forest Service, North Central Forest Experiment Station, Rhinelander, Wis.
B. H. McCown. University of Wisconsin, Madison, Wis.
- 877 Species Screening and Biomass Trials of Woody Plants in the Semi-Arid Southwest United States**
Biomass 18, pp. 15-29 (1989)
R. D. Kirmse, J. T. Fisher. Energy/Development International, Washington, D.C.

- 878 *Physiological, Morphological and Anatomical Components of Hybrid Vigor in Populus***
Structural and Functional Responses to Environmental Stresses, ed. K. H. Kreeb, H. Richter, and T. M. Hinckley, pp. 199–217 (The Hague, The Netherlands: SPB Academic Publishing bV, 1989)
T. M. Hinckley, R. Ceulemans, J. M. Dunlap, A. Figliola, P. E. Heilman, G. Scarascia-Mugnozza, P. J. Schulte, B. Smith, R. F. Stettler, E. Van Volkenburg, B. M. Wiard. University of Washington, Seattle, Wash.
J. G. Isebrands. USDA Forest Service, North Central Experiment Station, Rhinelander, Wis.
- 879 *Using N₂-fixing Albizia to Increase Growth of Eucalyptus Plantations in Hawaii***
Forest Science 35, pp. 64–75 (1989)
D. S. DeBell, C. D. Whitesell, T. H. Schubert. USDA Forest Service, Pacific Northwest Station, Portland, Ore.
- 880 *Biomass Production from Selected Herbaceous Species in the Southeastern USA***
Biomass 20, pp. 187–97 (1989)
D. I. Bransby, C. Y. Ward, P. A. Rose, S. E. Sladden, D. D. Kee. Auburn University, Auburn, Ala.
- 881 *The Potential of Vegetable Oil as an Alternate Source of Liquid Fuel for Agriculture in the Pacific Northwest VI***
Miscellaneous Series No. 121 (Moscow, Idaho: University of Idaho, 1989)
D. L. Auld, R. A. Korus, C. L. Peterson. University of Idaho, Moscow, Idaho
- 882 *Ethanol Production and the Environment***
Energy 14, pp. 451–68 (1989)
D. B. Hunsaker, Jr., J. F. McBrayer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
J. L. Elmore. PEER Consultants, Oak Ridge, Tenn.
- 883 *Photosynthetic Reinvigoration of Leaves Following Shoot Decapitation and Accelerated Growth of Coppice Shoots***
Physiol. Plant. 75, pp. 157–65 (1989)
T. J. Tschaplinski. Automated Sciences Group, Inc., Oak Ridge, Tenn.
T. J. Blake. University of Toronto, Toronto, Ontario, Canada
- 884 *The Role of Sink Demand in Carbon Partitioning and Photosynthetic Reinvigoration Following Shoot Decapitation***
Physiol. Plant. 75, pp. 166–73 (1989)
T. J. Tschaplinski. Automated Sciences Group, Inc., Oak Ridge, Tenn.
T. J. Blake. University of Toronto, Toronto, Ontario, Canada
- 885 *Comparisons Among Populus Clones and Intensive Culture Conditions Using an Energy Conversion Model***
Forest Ecology and Management 27, pp. 129–47 (1989)
J. J. Landsberg. Commonwealth Scientific and Industrial Research Organization, Australia
L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.

886 Water Stress Tolerance and Late-Season Organic Solute Accumulation in Hybrid Poplar

Can. J. Bot. **67**, pp. 1681-88 (1989)

T. J. Tschaplinski. Automated Sciences Group, Inc., Oak Ridge, Tenn.

T. J. Blake. University of Toronto, Toronto, Ontario, Canada

887 Correlation Between Early Root Production, Carbohydrate Metabolism, and Subsequent Dry Matter Production in Hybrid Poplar

Can. J. Bot. **67**, pp. 2168-74 (1989)

T. J. Tschaplinski. Automated Sciences Group, Inc., Oak Ridge, Tenn.

T. J. Blake. University of Toronto, Toronto, Ontario, Canada

888 Commercialization of Short-Rotation Intensive Culture Tree Production in North America

Energy from Biomass and Wastes XII, ed. D. L. Klass, pp. 261-74 (Chicago: Institute of Gas Technology, 1989)

L. L. Wright. Oak Ridge National Laboratory, Oak Ridge, Tenn.

889 Water Relations and Photosynthetic Capacity as Determinants of Productivity in Hybrid Poplar Cultivars

Can. J. Bot. **67**, pp. 1689-97 (1989)

T. J. Tschaplinski. Automated Sciences Group, Inc., Oak Ridge, Tenn.

T. J. Blake. University of Toronto, Toronto, Ontario, Canada

BIOTECHNOLOGY

- 890 ***Sustained Degradation of n-Pentane and Isobutane in Gas-Phase Bioreactor***
Biotechnol. Lett. 15(6), pp. 633-36 (June 1993)
 B. H. Davison, J. E. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 891 ***Advanced Bioprocessing Concepts: Technology Needs and R&D Opportunities Preliminary Assessment***
 ORNL/M-2629 (January 15, 1993)
 B. H. Davison, C. D. Scott, T. C. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 892 ***Continuous Direct Solvent Extraction of Butanol in a Fermenting Fluidized-Bed Bioreactor with Immobilized Clostridium acetobutylicum***
Appl. Biochem. Biotech. 39/40, pp. 415-26 (1993)
 B. H. Davison, J. E. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 893 ***Advanced Bioreactors for Enhanced Production of Chemicals***
 pp. 304-307 in *Preprints: 205th American Chemical Society National Meeting, Denver, March 28-April 2, 1993*, 38(2) (American Chemical Society, 1993)
 B. H. Davison, C. D. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 894 ***Three Immobilized-Cell Columnar Bioreactors for Enhanced Production of Commodity Chemicals***
Proceedings of the First Biomass Conference of the Americas—Energy, Environment, Agriculture, and Industry, August 30–September 2, 1993, Burlington, Vermont (Golden, Colo.: National Renewable Energy Laboratory, 1993)
 B. H. Davison, C. D. Scott, E. N. Kaufman. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 895 ***A Proposed Biparticle Fluidized-Bed for Lactic Acid Fermentation and Simultaneous Adsorption***
Biotechnology and Bioengineering 39(3), pp. 365-68 (1992)
 B. H. Davison, C. D. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 896 ***Simultaneous Fermentation and Separation of Lactic Acid in a Biparticle Fluidized Bed Bioreactor***
Appl. Biochem. and Biotech., 34/35, pp. 431-39 (1992)
 B. H. Davison, J. E. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 897 ***Technoeconomic Evaluation of the Extractive Fermentation of Butanol as a Guide to Research in This Area of Biotechnology***
 ORNL/TM-11851 (September 1991)
 R. M. Busche. Bio En-Gene-Er Assoc., Inc., Wilmington, Del.

- 898 ***The Ultimate Ethanol: Technoeconomic Evaluation of Ethanol Manufacture, Comparing Yeast vs Zymomonas Bacterium Fermentations***
 ORNL/TM-11852 (August 1991)
 R. M. Busche. Bio En-Gene-Er Associates, Inc., Wilmington, Del.
 C. D. Scott, B. H. Davison. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 L. R. Lynd. Dartmouth College, Hanover, N.H.

- 899 Phase Holdup and Dispersion in a Three-Phase Fluidized-Bed Bioreactor with Low-Density Gel Beads**
Annals of the New York Academy of Sciences 589, pp. 670-77 (1990)
B. H. Davison. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 900 Use of Immobilized Microbial Membrane Fragments to Reduce Oxygen Content and Enhance the Acetone-Butanol Fermentation**
Biotechnol. Prog. 6, pp. 210-13 (1990)
F. Godia. Unitat d'Enginyeria Quimica, Universitat Autonoma de Barcelona, Spain
H. I. Adler. Oak Ridge Associated Universities, Oak Ridge, Tenn.
B. H. Davison, C. D. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 901 Gas Holdup in Three-Phase Immobilized Cell Bioreactors**
Appl. Biochem. Biotech. 24/25, pp. 485-96 (1990)
R. Bajpai. University of Missouri-Columbia, Columbia, Mo.
J. E. Thompson, B. H. Davison. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 902 Corn Products as Chemical Feedstocks: The Corn Refinery**
Proceedings First Annual Corn Utilization Conference, St. Louis, Mo., June 11-12, 1987, pp. 286-99 (National Corn Growers Association, 1989)
C. D. Scott. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 903 Dispersion and Holdup in a Three-Phase Fluidized-Bed Bioreactor**
Appl. Biochem. Biotechnol. 20-21, pp. 449-60 (Clifton, N.J.: Humana Press, 1989)
B. H. Davison. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 904 Solute Diffusion in Biocatalyst Gel Beads Containing Biocatalysts and Other Additives**
Enzyme Microb. Technol. 11, pp. 258-63 (1989)
C. D. Scott, J. A. Woodward, J. E. Thompson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

CONTINUOUS CHROMATOGRAPHY IN MULTICOMPONENT SEPARATIONS

- 905 *Advanced Techniques for Energy-Efficient Industrial-Scale Continuous Chromatography***
 ORNL/TM-11282 (November 1989)
 J. P. DeCarli II. Dow Chemical Company, Midland, Mich.
 G. Carta. University of Virginia, Charlottesville, Va.
 C. H. Byers. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 906 *Large-Scale Separation of Amino Acids by Continuous Displacement Chromatography***
 DOE/OR/21400-T468* (October 1989)
 J. P. DeCarli II. Dow Chemical Company, Midland, Mich.
 G. Carta. University of Virginia, Charlottesville, Va.
 C. H. Byers. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 907 *An Economic and Energy Evaluation of the Replacement of Conventional Technology with Continuous Chromatography in the Dump Leaching of Copper Ores***
 DOE/OR/21400-T35* (February 1989)
 C. H. Byers, J. M. Begovich. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 J. M. Holmes. JMH Associates, Knoxville, Tenn.
- 908 *Novel Applications of Continuous Annular Chromatography: Separation of Sugars***
New Directions in Sorption Technology, ed. G. E. Keller II and R. T. Yang, pp. 342-49
 (Stoneham, Mass.: Butterworth, 1989)
 A. J. Howard. University of Florida, Gainesville, Fla.
 G. Carta. University of Virginia, Charlottesville, Va.
 C. H. Byers. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 909 *Pilot-Scale Studies of Sugar Separations by Continuous Chromatography***
Appl. Biochem. Biotechnol. 20-21, pp. 635-54 (Clifton, N.J.: Humana Press, 1989)
 C. H. Byers, W. G. Sisson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 J. P. DeCarli, G. Carta. University of Virginia, Charlottesville, Va.
- 910 *The Use of Gradient Elution in Optimizing Continuous Annular Ion Exchange Chromatography with Applications to Metal Separations***
Ion Exchange for Industry, Proceedings IEX '88, Cambridge, Great Britain, July 17-22, 1988, ed. M. Streat, pp. 424-42 (Chichester: E. Horwood, 1989)
 C. H. Byers, W. G. Sisson. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 J. P. DeCarli. University of Virginia, Charlottesville, Va.
- 911 *Separation of Metals by Continuous Annual Chromatography with Step Elution***
Chem. Eng. Comm. 79, pp. 207-27 (1989)
 J. P. DeCarli, G. Carta. University of Virginia, Charlottesville, Va.
 C. H. Byers, W. G. Sisson. Oak Ridge National Laboratory, Oak Ridge, Tenn.

*Available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22151.

SENSORS FOR ELECTROLYTIC CELLS

- 912** ***Temperature Measurement by Observation of the Raman Spectrum of Diamond***
Appl. Spectrosc. **46**, pp. 375-77 (1992)
S. Dai, J. P. Young, G. M. Begun. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. Mamantov. University of Tennessee, Knoxville, Tenn.
- 913** ***Measurement of Radical Cation UV-Visible Spectrum in a Polycrystalline Freon Matrix at Liquid Nitrogen Temperature by Diffuse Reflectance Spectroscopy***
Appl. Spectrosc. **46**, pp. 377-78 (1992)
S. Dai, J. P. Young. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. Mamantov, J. T. Wang, F. Williams. University of Tennessee, Knoxville, Tenn.
- 914** ***A New Sample Cell for Diffuse Reflectance IR Spectroscopy of Air-Sensitive Solid Samples***
Appl. Spectrosc. **45**, pp. 1056-58 (1991)
S. Dai, J. P. Young. Oak Ridge National Laboratory, Oak Ridge, Tenn.
G. Mamantov. University of Tennessee, Knoxville, Tenn.

HYDROPOWER ENVIRONMENTAL MITIGATION

- 915 **Status of Fish Passage Facilities at Non-federal Hydropower Projects**
Fisheries 18(7), p. 4 (July 1993)
 G. F. Cada, M. J. Sale. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 916 **Benefits of Fish Passage and Protection Measures at Hydroelectric Projects**
Waterpower '93, Proceedings of the International Conference on Hydropower, Nashville, Tenn., August 10-13, 1993 (New York: American Society of Civil Engineers, 1993)
 G. F. Cada, D. W. Jones. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 917 **Standardizing In-Stream Flow Requirements at Hydropower Projects in the Cascade Mountains, Washington**
Waterpower '93, Proceedings of the International Conference on Hydropower, Nashville, Tenn., August 10-13, 1993 (New York: American Society of Civil Engineers, 1993)
 I. M. Smith. Oak Ridge Institutes for Science and Education, Oak Ridge, Tenn.
 M. J. Sale. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 918 **Environmental Requirements at Hydroelectric Power Projects**
Book of Abstracts, 205th American Chemical Society National Meeting, Denver, March 28-April 2, 1993 (1993)
 J. E. Francfort. EG&G Idaho, Idaho Falls, Idaho
 G. F. Cada. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 919 **Use of Rapid Bioassessment Approaches to Examine Benthic Macroinvertebrate Responses to Hydropower Flow Diversions**
Bull. North American Benthological Society 10(1), p. 113 (1993)
 G. F. Cada. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 920 **Use of a Reservoir Water Quality Model to Simulate Global Climate Change Effects on Fish Habitat**
Clim. Change 20, pp. 277-96 (1992)
 L. H. Chang, S. F. Railsback. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 R. T. Brown. Jones & Stokes Assoc., Sacramento, Calif.

- 921 **Environmental Mitigation at Hydroelectric Projects. Volume 1. Current Practices for Instream Flow Needs, Dissolved Oxygen, and Fish Passage**
 DOE/IE-10360* (December 1991)
 M. J. Sale, G. F. Cada, L. H. Chang, S. W. Christensen, S. F. Railsback. Oak Ridge National Laboratory, Oak Ridge, Tenn.
 J. E. Francfort, B. N. Rinehart, G. L. Sommers. Idaho National Engineering Laboratory, Idaho Falls, Idaho

- 922 **A New Look at Environmental Mitigation Practices**
Hydro Review, pp. 58-66 (July 1991)
 M. J. Sale, S. F. Railsback. Oak Ridge National Laboratory, Oak Ridge, Tenn.

- 923 **Environmental Impacts of Increased Hydroelectric Development at Existing Dams**
 ORNL/TM-11673 (April 1991)
 S. F. Railsback, G. F. Cada, C. H. Petrich, M. J. Sale, J. A. Shaakir-Ali, J. A. Watts, J. W. Webb. Oak Ridge National Laboratory, Oak Ridge, Tenn.

* Available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161.

- 924 ***Review of Mitigation Methods for Fish Passage, Instream Flows, and Water Quality***
Waterpower '91, Proceedings of the International Conference on Hydropower, Denver, Colorado, July 24-26, 1991, ed. D. D. Darling, 1, pp. 209-18 (New York: American Society of Civil Engineers, 1991)
S. F. Railsback, G. F. Cada, L. H. Chang, M. J. Sale. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 925 ***Effects of Hydroelectric Turbine Passage on Fish Early Life Stages***
Waterpower '91, Proceedings of the International Conference on Hydropower, Denver, Colorado, July 24-26, 1991, ed. D. D. Darling, pp. 318-26 (New York: American Society of Civil Engineers, 1991)
G. F. Cada. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 926 ***Distribution and Stability of Potential Salmonid Spawning Gravels in Steep Boulder-Bed Streams of the Eastern Sierra Nevada***
Transactions of the American Fisheries Society 120(2), pp. 177-86 (1991)
G. M. Kondolf, G. F. Cada, M. J. Sale. Oak Ridge National Laboratory, Oak Ridge, Tenn.
T. Felando. INYO National Forest, Bishop, Calif.
- 927 ***Improving the Assessment of Instream Flow Needs for Fish Populations***
Waterpower '91, Proceedings of the International Conference on Hydropower, Denver, Colorado, July 24-26, 1991, ed. D. D. Darling, 1, pp. 76-84 (New York: American Society of Civil Engineers, 1991)
M. J. Sale. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. G. Otto. R. G. Otto & Associates, Arlington, Va.
- 928 ***A Review of Studies Relating to the Effects of Propeller-Type Turbine Passage on Fish Early Life Stages***
North American Journal of Fisheries Management 10, pp. 418-26 (1990)
G. F. Cada. Oak Ridge National Laboratory, Oak Ridge, Tenn.

ENVIRONMENTAL CONTROL TECHNOLOGY

- 929 Study of Solar Assisted Thermoelectric Technology for Automobile Air Conditioning**
J. Solar Energy Eng. 115(4), p. 200 (November 1993)
V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
B. Mathiprakasam, P. Heenan. Midwest Research Institute, Kansas City, Mo.
- 930 Heating, Ventilation, and Air Conditioning Systems**
Proceedings of the Annual Automotive Technology Development Contractors' Coordination Meeting, Dearborn, Mich., Nov. 2-5, 1992, pp. 609-16 (Warrendale, Pa.: Society of Automotive Engineers, May 1993)
D. M. Kyle. Oak Ridge National Laboratory, Oak Ridge, Tenn.
R. A. Sullivan. Office of Energy Efficiency and Renewable Energy, Department of Energy, Washington, D. C.
- 931 The Oak Ridge National Laboratory Automobile Heat Pump Model: User's Guide**
ORNL/CON-359 (May 1993)
D. M. Kyle. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 932 R-134a Liquid Over-Feeding Mobile Air Conditioning System**
Proceedings Vehicle Thermal Management Systems, Columbus, Ohio, March 29-April 1, 1993, SAE P-263 (Warrendale, Pa.: Society of Automotive Engineers, 1993)
V. C. Mei, D. M. Kyle, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 933 An Automobile Air Conditioner Design Model**
Proceedings Vehicle Thermal Management Systems, Columbus, Ohio, March 29-April 1, 1993, SAE P-263, pp. 571-76 (Warrendale, Pa.: Society of Automotive Engineers, 1993)
D. M. Kyle, V. C. Mei, F. C. Chen. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 934 Alternative Non-CFC Mobile Air Conditioning**
ORNL/CON-335 (September 1992)
V. C. Mei, F. C. Chen, D. M. Kyle. Oak Ridge National Laboratory, Oak Ridge, Tenn.

CONTINUOUS FIBER CERAMIC COMPOSITE TECHNOLOGY

- 935 ***Modelling the Thermal Conductivity of Fiber-Reinforced Ceramic Composites***
Ceramic. Engr. & Sci. Proc. 14(9/10), p. 1058 (September 1993)
S. C. Beecher, R. B. Dinwiddie. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 936 ***Influence of Fiber Coatings on the Oxidation of Fiber-Reinforced SiC Composites***
Ceramic Engineering and Science Proceedings July–August 1993. 17th Annual Conference on Composites and Advanced Ceramic Materials 14(7/8), part 1, pp. 358–66 (Westerville, Ohio: American Ceramic Society, 1993)
P. F. Tortorelli, L. Riester, R. A. Lowden. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. Nijhawan. Coe College, Cedar Rapids, Iowa
- 937 ***Development of an Interfacial Test System for the Determination of Interfacial Properties in Fiber Reinforced Ceramic Composites***
Ceramic Engineering and Science Proceedings July–August 1993. 17th Annual Conference on Composites and Advanced Ceramic Materials 14(7/8), part 1, pp. 156–67 (Westerville, Ohio: American Ceramic Society, 1993)
A. A. Wereszczak, M. K. Ferber, R. A. Lowden. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 938 ***The Relative Residual Fiber Displacement After Indentation Loading and Unloading of Fiber-Reinforced Ceramic Composites***
J. Mater. Sci. 28(8), pp. 2227–32 (April 15, 1993)
C. H. Hsueh, M. K. Ferber, A. A. Wereszczak. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 939 ***Evaluations of Residual Axial Stresses and Interfacial Friction in Nicalon Fiber-Reinforced Macro-Defect-Free Cement Composites***
J. Mater. Sci. 28, pp. 2551–56 (1993)
C. H. Hsueh, M. K. Ferber. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 940 ***Some Considerations of Two-Way Debonding During Fibre Pull-Out***
J. Mater. Sci. Lett. 12, pp. 1933–36 (1993)
C. H. Hsueh, P. F. Beecher. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 941 ***Continuous Fiber Ceramic Composite Program***
Ceram. Bull. 70, p. 430 (1991)
M. A. Karnitz, D. F. Craig. Oak Ridge National Laboratory, Oak Ridge, Tenn.
S. L. Richlen. Office of Energy Efficiency and Renewable Energy, Department of Energy, Washington, D. C.

PHYSICAL CHEMISTRY OF GEOTHERMAL SYSTEMS

- 942** *Isoplestic Studies of $\text{NaHSO}_4(\text{aq})$. Thermodynamic Properties*
Journal of Chemical Thermodynamics 25(1), pp. 99–110 (1993)
H. F. Holmes, R. E. Mesmer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 943** *The Activity-Composition Relationship of Oxygen and Hydrogen Isotopes in Aqueous Salt Solutions: I. Vapor-Liquid Water Equilibration of Single Salt Solutions from 50 to 100°C*
Geochimica et Cosmochimica Acta 57(13), pp. 2797–2817 (1993)
J. Horita, D. J. Wesolowski, D. R. Cole. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 944** *The Activity-Composition Relationship of Oxygen and Hydrogen Isotopes in Aqueous Salt Solutions: II. Vapor-Liquid Water Equilibration of Mixed Salt Solutions from 50 to 100°C and Geochemical Implications*
Geochimica et Cosmochimica Acta 57(19), pp. 4703–11 (1993)
J. Horita, D. R. Cole, D. J. Wesolowski. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 945** *Liquid-Vapor Partitioning of $\text{HCl}(\text{aq})$ to 350°C*
Geochimica et Cosmochimica Acta 57(1), pp. 1–7 (1993)
J. M. Simonson, D. A. Palmer. Oak Ridge National Laboratory, Oak Ridge, Tenn.
- 946** *Aluminum Speciation and Equilibria in Aqueous Solution. III. Potentiometric Determination of the First Hydrolysis Constant of Aluminum(III) in Sodium Chloride Solutions to 125°C*
Geochimica et Cosmochimica Acta 57(13), pp. 2929–38 (1993)
D. A. Palmer, D. J. Wesolowski. Oak Ridge National Laboratory, Oak Ridge, Tenn.

AUTHOR INDEX

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