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STAFF ROSTER FOR 1979 - ENERGY SCIENCES PROGRAMS

December 1979

DEPARTMENT OF ENERGY AND ENVIRONMENT

BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973

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[General, Miscellaneous, and Progress
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STAFF ROSTER FOR 1979 -
ENERGY SCIENCES PROGRAMS

B. MANOWITZ, Chairman
D.H. GURINSKY, Coordinator for Energy Sciences

December 1979

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ENERGY SCIENCES

DAVID H. GURINSKY Senior Scientist

Education B.S. in Chemistry, New York University 1936.
Ph.D. in Physical Chemistry, New York University 1942.

Research Interests Nuclear Metallurgy Graphite Technology. Irradiation Effects in Materials - Introduced Inert Arc Welding of Aluminum for Uranium Fuel Cladding of Uranium Fuel Elements, Liquid Metal Corrosion. Superconductivity and Superconductor Development. Superconducting Power Transmission-Fusion Simulated Source (D. Lithium neutron generator.)

Committees Past Director and Fellow of American Nuclear Society. Fellow of American Society for Metals. Member of AIME. President School Board, Genesee-Moriches School System. Phi Beta Kappa Sigma Xi. Delegate to first Geneva Conference on Peaceful Uses of Atomic Energy. Member of the Metal Sciences Club of New York.

Summary of Experience Research Associate, Manhattan Project at University of Chicago, 1942-44, in charge of uranium fabrication - welding of aluminum. Research Associate, Manhattan Project at Los Alamos Scientific Laboratory, 1944-46; Head of High Explosives Laboratory at S site. Consultant on start-up of facility at NOTS, Inyokern, California, 1946. Research Associate, Institute for the Study of Metals, University of Chicago, 1946-47. Head of Materials for Brookhaven Graphite Reactor, Brookhaven National Laboratory, 1947-50. Head of Metallurgy Division, Departments of Nuclear Engineering, Applied Science, and Energy and Environment, Brookhaven National Laboratory, 1950-79. Member of BNL Reactor Critical and Safety Committee. Consultant to General Atomic, General Dynamics Corporation, San Diego (on leave 1959-60), developed High Temperature Gas Cooled Materials Program; Associate Chairman, Deputy Chairman, Department of Energy and Environment, Brookhaven National Laboratory, 1978 to present.

Selected Publications P. Grand (Ed.) and D. H. Gurinsky (Contributor), "Proposal for an Accelerator-Based Neutron Generator," BNL 20159, July 1975.

A. N. Goland, D. H. Gurinsky, J. Hendrie, J. Kukkonen, T. Sheehan and C. L. Snead, Jr., "Production and Use of Li(d,n) Neutrons for Simulation of Radiation Effects in Fusion Reactors," International Conference on Radiation Test Facilities for the CTR Surface and Materials Program, ANL, Argonne, IL, July 15-18, 1975.

Selected
Publications
(con't)

P. Goland, K. Batchelor, J. P. Blewett, A. Goland,
D. Gurinsky, J. Kukkonen, and C. L. Snead, Jr., "An Intense
Lithium (d,n) Neutron Radiation Test Facility for Con-
trolled Thermonuclear Reactor Materials Testing," Nuclear
Technology 29(3), 327 (June 1976).

DONALD J. METZ	Senior Chemist
Education	St. Francis College, Brooklyn, New York (B.S. in Chemistry, 1947); Polytechnic Institute of Brooklyn, Brooklyn, New York (M.S. in Physical Chemistry, 1949; Ph.D. in Physical Chemistry, 1955).
Research Interests	Polymer Chemistry and Physics; Radiation Induced Processes in Organic Compounds and Materials.
Professional Affiliations	American Chemical Society; American Institute of Chemists; American Association for the Advancement of Science; Sigma Xi; Phi Lambda Upsilon.
Summary of Experience	Conducted research on radiation induced polymerization, ranging from basic studies on polymerization mechanisms to radiation processing and modification of polymers. Participated in Atoms at Work foreign exhibit program of AEC in Brazil, Chile, the Netherlands, and Turkey. Served a number of years as Secretary, then Chairman, of ASTM Joint Subcommittee D9/D11 on Radiation Effects on Polymers and Electrical Insulating Materials. Member of Editorial Advisory Boards of the Journals of Polymer Chemistry and Applied Polymer Chemistry. Adjunct Professor of Physical Chemistry, St. Francis College, Brooklyn, New York, 1947-1977. Director, NSF Institute on Energy for high school teachers, 1974 to present.
Selected Publications	<p>S. Machi, J. Silverman and D. J. Metz, "Radiation-Induced Polymerization of Pure Styrene at Low Temperature," <u>Third Tihany Symposium on Radiation Chemistry Proceedings, Tihany Hungary</u>, May 10-15, 1971; <u>J. Phys. Chem.</u> <u>76</u>, 930-3/ (1972).</p> <p>D. J. Metz (Editor), "Abstracts of Reports Published in Energy Sciences Programs, - January 1978 to December 1978," BNL 50972.</p> <p>D. J. Metz (Editor), "Annual Highlights in Energy Sciences- January 1978 to December 1978," BNL 50973.</p>

MASAKI SUENAGA

Metallurgist

Education

Pasadena City College (A.A. in Engineering, 1960); University of California (B.S. in Electrical Engineering, 1962, M.S. in Electrical Engineering, 1964, Ph.D. in Metallurgy, 1969); Postdoctoral Fellow, Lawrence Berkeley Laboratory, 1969.

Research Interests

Superconducting Materials; Mechanical Properties; Phase Stability; Applications of Electron Microscopy, X-Ray Diffraction, and Neutron Scattering.

Professional Affiliations

The Metallurgical Society of AIME; American Physical Society; American Society for Metals; American Association for the Advancement of Science.

Committees

Board Member, International Cryogenic Material Conference; Advisory Committee Member, Applied Superconductivity Conference; User's Committee Member, National Magnet Laboratory, MIT for National Science Foundation; Adjunct Professor of Materials Science, State University of New York at Stony Brook.

Summary of Experience

Responsible for administration of the Division of Metallurgy and Materials Science; development of Al₅ type multifilamentary superconductors and of low ac loss superconducting Nb₃Sn; developed understanding for dislocation motion in metals and alloys at near zero degree; advise U.S. Magnetic Fusion Committee for development of superconductors for high magnetic field applications; participate in exchange programs between U.S. and U.S.S.R. on Superconducting Power Transmission Line and between U.S. and Japan on Magnetic Fusion Energy.

Selected Publications

K. Aihara, M. Suenaga, and Thomas Luhman, "Effects of Differential Thermal Contraction between the Matrix and the Filaments in Mono- and Multifilamentary Nb₃Sn on the Superconducting Critical Temperature", Eighth Symposium on Engineering Problems of Fusion Research, San Francisco, CA, Nov. 16-18, 1979.

C. L. Snead, Jr. and M. Suenaga, "Radiation-Enhanced-Diffusion Growth of Nb₃Sn Monofilaments: Grain-Size Effects on Critical-Current Density", Applied Physics Letters 36, 225 (1980).

J. F. Bussiere, D. O. Welch, and M. Suenaga, "Young's Modulus of Polycrystalline Nb₃Sn between 4.2 and 300 K", J. Appl. Phys. 51, 1024-30 (1980).

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MEYER STEINBERG	Chemical Engineer
Education	B. Ch. E. - The Cooper Union, School of Engineering 1941-1944 M. Ch. E. - Polytechnic Institute of Brooklyn 1947-1949 Prof. Engr. New York State License 1953
Research Interests	Chemical process research and development, synthetic fuel production, energy conversion, composite materials sciences, nuclear fuel production and waste reprocessing, conservation.
Professional Affiliations	American Institute of Chemical Engineers (AIChE), American Chemical Society (ACS), American Association for the Advancement of Science (AAAS), Sigma Xi, American Nuclear Society (ANS), and American Concrete Institute (ACI)
Committees	Executive Board of LI Section of AIChE, LI Section of ANS, Alternative Energy Systems Division ANS, Advisory Committee of Academy of Science National Cooperative Highway Research Program (NCHRP)
Summary of Experience	Head, BNL Process Sciences Division; present research and development includes: coal conversion, liquefaction and gasification, fluidized-bed combustion and regeneration of sulfated limestone, environmental control technology of flash hydropyrolysis of coal and global CO ₂ problem, concrete-polymer materials development for geothermal energy applications and for highway construction, conservation programs in recycling waste glass for sewer pipe, synthesis and utilization of low cost copolymers of ethylene with CO and with SO ₂ (polyketones and polysulfones), use of fission and fusion reactors for synthetic fuels production, linear accelerators for nuclear fuel production and transmutation of fission product waste. Performed extensive research on radiation processes for the fixation of nitrogen, decomposition of CO ₂ , and production of ozone. Invited speaker at a number of national and international scientific conferences.
Selected Publications	M. Steinberg and P. Fallon, "Flash Hydropyrolysis of Coal", Chem. Engr. Progress <u>75</u> (6) 63 (1979).

Selected
Publications

M. Steinberg, P. Colombo, L. E. Kukacka, and
B. Manowitz, "Method of Producing Plastic Impreg-
nated Concrete", U.S. Pat. 3,567,496, Assigned to
US AEC (March 2, 1971).

M. Steinberg, "Fission Recoil Synthesis", Chem.
Engr. Progress 62(9), 105 (1966).

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CHEMICAL SCIENCES

DIVISION

D. J. METZ

GARO H. ARMEN	Research Associate
Education	Queens College (B.A. in Chemistry, 1976); Graduate Center City University of New York (Ph.D. in Physical Chemistry, 1980).
Research Interests	Mechanism of Electron Transport across Bilayer Lipid Membranes; Applications of Photoelectron Spectroscopy to Chemical Systems; Complexation Studies of Macrocyclic-Metal Systems.
Professional Affiliations	American Chemical Society.
Summary of Experience	Designed an electron impact spectrometer. Built a photoelectron spectrometer. Successfully used photoelectron spectroscopic results to probe conformation, electronic structure and chemical reactivity.
Selected Publications	<p>A. D. Baker, D. Wong, S. Lo, N. Bloch, G. Armen, N. L. Goldman, R. Engo and D. C. Liotta, "The Reaction of N-arylnitron with Dichloroketene: A New Synthesis of Isatin," <u>Tetrahedron Letters</u>, 215 (1978).</p> <p>G. Armen, H. Brittain and A. D. Baker, "The He(I) Photoelectron Spectra of Some γ-substituted Co(III) Acetylacetonate Complexes," <u>Journal of Electron Spectroscopy and Related Phenomenon</u> 16, 107 (1979).</p> <p>G. Armen and A. D. Baker, "The Reaction of Azoxyanisole with Oxalyl Chloride: The Use of Photoelectron Spectroscopy in Seeking New Reactions," <u>Tetrahedron Letters</u>, 4119 (1979).</p>

KATHLEEN M. BARKIGIA	Research Associate
Education	LeMoyne College (B.S. with honors in Chemistry, 1973); Georgetown University (M.S. in Physical Inorganic Chemistry, 1975; Ph.D. in Inorganic Chemistry, 1978).
Research Interests	Single Crystal X-Ray and Neutron Diffraction; Synthesis and Characterization of Inorganic Species.
Professional Affiliations	American Chemical Society; American Crystallographic Association.
Committees	Program Chairman, Women in Science; Member, WIS.
Summary of Experience	Single crystal X-ray diffraction studies of porphyrin and porphyrin-like materials. Synthesis, characterization and X-ray and neutron diffraction investigations of oxometallates, transition metal compounds, and main group coordination complexes. Teaching recitation and laboratory sections in General and Organic Chemistry.
Selected Publications	<p>K. M. Barkigia, J. Fajer and G. J. B. Williams, "The Crystal and Molecular Structure of $\alpha,\beta,\gamma,\delta$-Tetrapropylporphyrinato Lead(II)," <u>American Crystallographic Association Meeting Proceedings, Boston, Massachusetts, August 17-21, 1979, Paper 58.</u></p> <p>S. H. Wasfi, W. Kwak, M. T. Pope, K. M. Barkigia, R. J. Butcher and C. O. Quicksall, "Protonation Induced Dynamic Stereochemistry of Hexatungstobisorganoarsonate Anions," <u>J. Am. Chem. Soc.</u> <u>100</u>, 7786-87 (1978).</p> <p>M. T. Pope, C. O. Quicksall, W. Kwak, L. M. Rajkovic, J. K. Stalick, K. M. Barkigia and T. F. Scully, "Organic Derivatives of Heteropoly Molybdates," <u>J. Less Common Metals</u> <u>54</u>, 129-39 (1977).</p>

JOHN S. BOOKLESS	Chemistry Associate II
Education	Purdue University (B.S. in Chemistry, 1950).
Research Interests	Present Interests Center on the Study of Metal Hydrides.
Summary of Experience	Pilot plant operation, fused salt spectrophotometry, vacuum and high temperature technology. Theoretical and applied metal hydride chemistry.
Selected Publications	<p>J. D. Van Norman, J. S. Bookless, and J. J. Egan, "A Spectrophotometric and Chronopotentiometric Study of the Lead-Lead Chloride and the Zinc-Zinc Chloride Systems," <u>J. Phys. Chem.</u> <u>70</u>, 1276 (1966).</p> <p>J. S. Bookless and J. J. Egan, "Use of F Centers for the Investigation of Alloy Thermodynamics. The Potassium-Lead System," <u>J. Phys. Chem.</u> <u>76</u>, 1202 (1972).</p> <p>R. J. Heus, S. Bookless, and J. J. Egan, "Some New Experimental Techniques for the Study of Alloy Thermodynamics," <u>AEC Conference on Thermodynamics Proceedings</u>, Denver Colorado, December 1972.</p>

MARY S. DAVIS	Associate Chemist
Education	College of Mt. St. Vincent (B.S. in Chemistry, 1970); University of Rochester (Ph.D. in Physical Chemistry, 1975).
Research Interests	Physical and Chemical Properties of Bioenergetic Systems;- Development and Application of Magnetic Resonance Techniques.
Professional Affiliations	American Chemical Society.
Summary of Experience	Optical, magnetic and redox properties of the anion and cations of porphyrins and porphyrin derivatives.
Selected Publications	<p>I. Fujita, M. S. Davis, J. Fajer, "Anions Radicals of Pheophytin and Chlorophyll a: Their Role in the Primary Charge Separation of Plant Photosynthesis," <u>J. Amer. Chem. Soc.</u> <u>100</u>, No. 19, 6280-82 (Sept. 1979).</p> <p>M. S. Davis, A. Forman, J. Fajer, "Ligated Chlorophyll a Cation Radicals: Their Function in Photosystem II of Plant Photosynthesis," <u>Proc. Nat'l. Acad. Sci. U.S.A.</u> <u>76</u>, No. 9, 4170-74 (Sept. 1979).</p> <p>M. S. Davis, A. Forman, L. K. Hanson, J. P. Thornber, J. Fajer, "Anion and Cation Radicals of Bacteriochloro- phyll and Bacteriopheophytin b. Their Role in the Primary Charge Separation of Rhodopseudomonas viridis," <u>J. Phys. Chem.</u> <u>83</u>, 3325-32 (Dec. 1979).</p>

JAMES J. EGAN	Chemist
Education	Northwestern University (B.S. in Chemistry, 1949); Indiana University (Ph.D. in Chemistry, 1953).
Research Interests	Solid State Chemistry; Molten Salt Chemistry; Electro-chemistry of Solids; Thermodynamics and High Temperature Thermochemistry.
Professional Affiliations	American Chemical Society; Electrochemical Society; Deutsche Bunsengesellschaft; Sigma Xi.
Summary of Experience	Brookhaven National Laboratory, 1953-present. Max-Planck-Institute for Physical Chemistry, 1960-61 (on leave). Technical University of Munich, 1966-67 (sabbatical). Performed research in above named fields during entire duration and published results.
Selected Publications	J. Delcet, A. Brune and J. J. Egan, "Coulometric Titrations Using CaF_2 and BaF_2 Solid Electrolytes to Study Alloy Phases," in <u>Calculation of Phase Diagrams and Thermochemistry of Alloy Phases</u> , Y. A. Chang and J. F. Smith, Editors, The Metallurgical Society of AIME, Warrendale, Pennsylvania, 275-86 (1979). J. Delcet and J. J. Egan, "Thermodynamics of Liquid Ca-Zn Alloys," <u>Met. Trans. B.</u> , Vol 9B, 728-29 (1978). J. Delcet, R. J. Heus and J. J. Egan, "Electronic Conductivity in Solid CaF_2 at High Temperatures," <u>J. Electrochem. Soc.</u> <u>125</u> , 755-58 (1978).

JACK FAJER

Chemist

Education

City College of New York (B.S. in Chemistry, 1957);
Brandeis University (Ph.D. in Physical Chemistry, 1962);
Research Associate, Brookhaven National Laboratory,
1962-1964.

Research Interests

Mechanisms of Bioenergetics in Photosynthetic and Enzy-
matic Reactions; Biomimetic Chemistry of Porphyrins.

Professional
Affiliations

American Chemical Society; Chemical Society (London);
Biophysical Society.

Summary of
Experience

Coordination chemistry of metal complexes in non-aqueous
solvents. Radiation chemistry of fluorocarbons. Role of
porphyrins and chlorophylls in photosynthesis and meta-
bolic reactions. Spectroscopy, electron spin resonance
of porphyrin radicals. Photoelectrochemistry of porphy-
rins and mechanisms of biomimetic energy transduction.

Selected
Publications

J. Fajer and M. S. Davis, "Electron Spin Resonance of
Porphyrin π Cations and Anions," in The Porphyrins,
D. Dolphin, Editor, Academic Press, New York, Vol. IV,
197-256 (1979).

M. S. Davis, A. Forman and J. Fajer, "Ligated Chlorophyll
Cation Radicals: Their Function in Photosystem II of
Plant Photosynthesis," Proc. Nat'l. Acad. Sci. U.S.A. 76,
No. 9, 4170-74 (Sept. 1979).

P. F. Richardson, C. K. Chang, L. D. Spaulding and
J. Fajer, "Radicals of Isobacteriochlorins: Models of
Siroheme and Sirohydrochlorin," J. Amer. Chem. Soc. 101,
7736-38 (Dec. 1979).

STEPHEN W. FELDBERG Chemist

Education Princeton University, Princeton, N.J. (Bachelor of Arts, 1958, Phi Beta Kappa, Howe Prize in Analytical Chemistry); Princeton University (Ph.D. in Analytical Chemistry, 1961); Postdoctoral Fellow, Brookhaven National Laboratory, 1962-1963.

Research Interests Electrochemistry: Theory of Coupling of Diffusion; Homogeneous Kinetic and Heterogeneous Kinetic Phenomena; Computer Simulation of Electrochemical Phenomena; Ion and Electron Transport Phenomena in Membranes; Photochemistry.

Professional Affiliations Biophysical Society.

Summary of Experience Chemistry Department Visiting Assistant Professor, teaching Analytical Chemistry, University of Kansas, Lawrence, Kansas, 1964. Brookhaven National Laboratory, Scientific Staff (DEE nee DNE, DAS), 1964-present. Visiting Associate Professor, teaching a graduate course in Electrochemistry, Department of Chemistry, University of Kansas, 1968. Visiting Professor of Chemistry, teaching Analytical Chemistry, Colorado State University, Fort Collins, Colorado, 1972. IAEA Expert, lecturing on computer simulation of electrochemical phenomenon, Comision Nacional Energia Atomica, Buenos Aires, Argentina, 1979.

Selected Publications Roger C. Young and Stephen W. Feldberg, "Photoinitiated Mediated Transport of H_3O^+ and/or OH^- Across Glycerol Monooleate Bilayers Doped with Magnesium Octaethylporphyrin," Biophysical Journal 27, 237 (1979).

Stephen W. Feldberg and Alicia B. Delgado, "Inner Voltage Clamping. A Method for Studying Interactions among Hydrophobic Ions in a Lipid Bilayer," Biophysical Journal 21, 71 (1978).

O. Anderson, S. Feldberg, H. Nakadomari, S. Levy, S. McLaughlin, "Electrostatic Interactions Among Hydrophobic Ions in Lipid Bilayer Membranes," Biophysical Journal 21, 35-70 (1978).

LAURENCE D. FOGEL Associate Chemist

Education New York University (B.A., 1970); Brandeis University (M.A., 1972; Ph.D. 1974); Postdoctoral Research Associate, Brookhaven National Laboratory, 1974-1976.

Research Interests Physical Chemistry; Photochemistry and Photophysics in Solution and the Gas Phase (Flash and Steady-State Photolysis); Reaction Kinetics and Mechanisms; Heterogeneous Chemistry.

Professional Affiliations American Chemical Society; Inter-American Photochemical Society.

Summary of Experience Present research centers on investigation of the kinetics and mechanisms involved in the photochemistry of nitrogen compounds, with particular emphasis on the transient species and permanent products formed in the thermal and photochemical reactions of hydrazines. Previously examined sulfuric dioxide-gas mixtures, deriving a model to account for the observed light scattering behavior. Earlier work involved investigation of the photochemistry of azoisopropane, using conventional and fast-kinetic techniques and standard analytical methods. Singlet energy transfer from a variety of aromatic hydrocarbon donors to a series of azoalkanes was also studied.

Selected Publications L. D. Fogel and J. W. Sutherland, "Aerosol Formation on the Flash Photolysis of SO₂/Gas Mixtures," 176th American Chemical Society National Meeting Proceedings, Miami, Florida, September 11-17, 1978; J. Chem. Phys. 70, 2775-88 (1979).

L. D. Fogel and C. Steel, "Photochemistry of Azoisopropane," J. Amer. Chem. Soc. 98, 4859 (1976).

ETSUKO FUJITA	Assistant Chemist
Education	Ochanomizu University (B.S. in Chemistry, 1972); Georgia Institute of Technology (Ph.D. in Chemistry, 1976).
Research Interests	Chemistry of Transition Metal Compounds.
Professional Affiliations	American Chemical Society
Summary of Experience	Study of magnetic properties and molecular structures of polynuclear transition metal compounds. Preparations, characterizations and X-ray molecular structures of various ferrocene derivatives.
Selected Publications	<p>M. Hillman and E. Fujita, "Bridged Ferrocenes III. The Crystal and Molecular Structure of 1,1',2,2',3,4,4',5'-Tetrakis(trimethylene)ferrocene," <u>J. Organometal. Chem.</u> <u>155</u>, 99-108 (1978).</p> <p>J. A. Bertrand, E. Fujita and D. G. VanDerveer, "Structure of a Tetranuclear Cobalt(II)-Cobalt(III) Complex of Bis-(2-hydroxyethyl)amine, $[\text{Co}_4 \{ \text{NH}(\text{C}_2\text{H}_4\text{OH})_2 \}_2 \{ \text{NH}(\text{C}_2\text{H}_4\text{O})_2 \}_4] (\text{ClO}_4)_2$," <u>Inorg. Chem.</u> <u>18</u>, 230-33 (Feb. 1979).</p> <p>J. A. Bertrand, P. G. Eller, E. Fujita, M. O. Lively and D. G. VanDerveer, "Polynuclear Complexes with Hydrogen-Bonded Bridges. 3. Oxygen-Oxygen Hydrogen Bonding between Tris Chelates of 2-Aminoethanol," <u>Inorg. Chem.</u> <u>18</u>, 2419-23 (Sept. 1979).</p>

ICHIRO FUJITA

Assistant Chemist

Education

Tokyo Institute of Technology (B.S. in Chemistry, 1965, M.Sc. in Chemistry, 1967; Ph.D. in Chemistry, 1971).

Research Interests

Physical Chemistry of Photosynthesis, Metalloporphyrins, and Transition Metal Complexes.

Professional
Affiliations

American Chemical Society

Summary of
Experience

Study of photochemistry of transition metal complexes. Instrumentation of spectrometers such as magnetic circular dichroism spectrometer, spectrofluorometer and stopped flow spectrometer. Synthesis of anion and cation radicals of metalloporphyrins and related compounds. Calculation of the pi-electronic state of the molecules using SCF-MO method.

Selected
Publications

L. K. Hanson, M. S. Davis, I. Fujita and J. Fajer, "M.O. Calculation of Chlorophylls and Chlorins," Biophysical J. 21, No. 3, 195a (March 1978).

I. Fujita, M. S. Davis, and J. Fajer, "Anion Radicals of Pheophytin and Chlorophyll a: Their Role in the Primary Charge Separations of Plant Photosynthesis," J. Amer. Chem. Soc. 100, No. 19, 6280-82 (Sept. 1979).

T. L. Netzel, P. Kroger, C. K. Chang, I. Fujita, J. Fajer, "Electron Transfer Reactions in Cofacial Diporphyrins," Chem. Phys. Lett. 67, Nos. 2,3, 223-28 (Nov. 1979).

THOMAS E. GANGWER Associate Chemist

Education Lebanon Valley College (B.S. in Chemistry, 1968);
University of Notre Dame (Ph.D in Physical Chemistry,
1973); Postdoctoral Fellow, Chemistry Department,
Brookhaven National Laboratory.

Research Interests Kinetic and Mechanistic Studies.

Professional
Affiliations American Chemical Society; American Association for the
Advancement of Science; New York Academy of Science.

Summary of
Experience Principal investigator of ongoing program studying the
basic kinetics and mechanisms of hydrogenation reactions
relevant to coal conversion. Advisor for in-service In-
stitute on Energy for high school teachers. Previously
directed program assessing and analyzing radiation damage
to materials used in nuclear waste streams. Conducted
inorganic photochemical study/review portion of a program
charged with assessment and analysis of separation schemes
applied to nuclear reactor waste.

Selected
Publications T. Gangwer, D. MacKenzie and S. Casano, "Hydroaromatic
Hydrogenation/Dehydrogenation," J. Phys. Chem. 83,
2013-15 (1979).

T. Gangwer and H. Prasad, "Hydrogen Transfer Catalytic
Activity of Minerals Common to Coal," Fuel 58, 577-84
(Aug. 1979).

T. Gangwer, "Gas Phase UV-V Spectra of Reacting Hydro-
aromatics Systems," J. Phys. Chem. 83, 2176-78 (1979).

BARRY M. GORDON

Associate Chemist

Education

University of California, Los Angeles (B.S. in Chemistry, 1951); Washington University, St. Louis (Ph.D. in Chemistry, 1955); Postdoctoral Fellow, Brookhaven National Laboratory, 1955-1957.

Research Interests

Trace Element Analysis by X-Ray Fluorescence; Effects of Trace Elements in Nutrition and Medicine; Organometallic Chemistry; Mechanism of Electron Transfer Reactions in Solution.

Professional
Affiliations

American Chemical Society; ACS Division of Nuclear Science; Sigma Xi.

Summary of
Experience

Responsible for coordinating the development and operation of an X-ray microprobe beam line for trace element analysis with micron spatial resolution at the National Synchrotron Light Source; established and operated a proton-induced X-ray fluorescence facility for trace element analysis; active in organometallic chemistry including synthesis and physical measurements of bridged ferrocene compounds; experienced in chemical kinetic studies of electron transfer reactions of coordination compounds; studied nuclear reaction mechanisms for projectile energies up to 3 GeV; studied the chemical effects accompanying nuclear transformation, particularly those resulting from the beta decay of tellurium to iodine.

Selected
Publications

B. M. Gordon, "Trace Element Analysis by Synchrotron Radiation Induced X-Ray Fluorescence," 2nd Conference on Inorganic and Nutritional Aspects of Cancer Proceedings, La Jolla, California, January 3-5, 1979.

M. Hillman, Barry Gordon, Allen J. Weiss, and A. P. Guzikowski, "Bridged Ferrocenes I," J. Organometal. Chem. 155, 77-86 (1978).

B. M. Bordon and H. W. Kramer, "On the Development of a System for Trace Element Analysis in the Environment by Charged Particle X-Ray Fluorescence," Journal of Radio-analytical Chemistry 12, 181-88 (1972).

LOUISE I. KARLE HANSON Assistant Chemist

Education University of Michigan, Ann Arbor, Michigan (B.S. in Chemistry, 1967; M.S. in Chemistry, 1969); Philipps-Universität, Marburg/Lahn, W. Germany, Fulbright-Hays Scholar, 1967-68; University of Washington, Seattle, Washington (Ph.D. in Chemistry, 1973); Postdoctoral Fellow, National Institutes of Health, Bethesda, Maryland, 1974-1976.

Research Interests Photosynthetic Processes which involve Chlorophyll; Structure and Function of Heme-enzymes; Applications to Synthetic Systems.

Professional Affiliations American Chemical Society.

Summary of Experience Elucidation of the electronic structure of porphyrin related biological chromophores in both in vivo and model systems. Role of these compounds, chlorophylls and hemes, in mediating photosynthetic and biochemical processes. Investigation of the effects of metal, axial ligands, macrocycle, and macrocyclic substituents on the electronic, hence the chemical properties of these compounds. Experience with optical spectroscopic (emission and polarized absorption) and X-ray crystallographic techniques. At BNL, the main focus has been the theoretical interpretation of the magnetic, redox, and optical properties of these compounds and their anions and cations, by means of molecular orbital calculations.

Selected Publications M. S. Davis, A. Forman, L. K. Hanson, J. P. Thornber, and J. Fajer, "Anion and Cation Radicals of Bacteriochlorophyll and Bacteriopheophytin b. Their Role in the Primary Charge Separation of Rhodopseudomonas viridis," J. Phys. Chem. **83**, No. 26, 3325-32 (Dec. 1979).

P. F. Richardson, C. K. Chang, L. K. Hanson, L. D. Spaulding, and J. Fajer, " π Cation Radicals of Isobacteriochlorins. Implications for Nitrite and Sulfite Reductases," ibid., 3420-24, (1979).

L. K. Hanson, "Axial Ligand Effects on Iron and Manganese Porphyrins: Extended Hückel Calculations of Cyt P450 Analogs and of O₂ Binding to Iron and Manganese," Intern. J. of Quantum Chem., Quantum Biol. Symp. #6, 73-87 (1979).

RAYMOND J. HEUS	Associate Chemist
Education	Columbia College (B.A. in Chemistry, 1942).
Research Interests	Chemistry of Fluorine and Its Compounds; Molten Salts; Solid Electrolytes; High Temperature Metals, Alloys and Ceramics.
Summary of Experience	SAM Laboratories, Manhattan Project, 1944-46; Union Carbide, Oak Ridge, Tennessee, 1946-1949, research on gaseous diffusion; Brookhaven Laboratory, 1949 to present, research on continuous separation processes for reactor breeder blankets, high temperature polarography, electrochemistry of molten salts, solid electrolyte high temperature emf studies, high temperature calorimetry.
Selected Publications	<p>J. Delcet, R. J. Heus, and J. J. Egan, "Electronic Conductivity in Solid CaF_2 at High Temperature," <u>J. Electrochem. Soc.</u> <u>125</u>, No. 5, 755-58 (May 1978).</p> <p>R. J. Heus and J. J. Egan, "Electronic Conduction in Molten Halides," <u>International Symposium on Molten Salts Proceedings, Washington, D.C., May 2-7, 1976</u>, 523-34.</p> <p>R. J. Heus and J. J. Egan, "Electronic Conductivity in Molten Lithium Chloride-Potassium Chloride Eutectic," <u>J. Phys. Chem.</u> <u>77</u>, No. 16, 1989-93 (1973).</p>

FRANK B. HILL	Chemical Engineer
Education	Catholic University of America (B.Ch.E., 1949); Princeton University (1959).
Research Interests	Chemical Reactor Design; Cyclic Separation Processes.
Professional Affiliations	American Chemical Society; American Institute of Chemical Engineers.
Summary of Experience	Performed high-temperature chemical engineering research in connection with a fuel reprocessing method for a liquid bismuth-fueled breeder reactor. Member of High Flux Beam Reactor Design Project; carried out basic investigation of chemical reactor design, including effects of non-steady (spatially and temporally) initiation rates, diffusion, and mixing. Participated, as a lecturer, in an IAEA sponsored course in Industrial Radiation Processing (Japan). Conducted field experiments to measure biogenic sulfur emission rates. Associated briefly in the High Temperature Gas-cooled Reactor safety program at BNL. Published on the dynamics of acid rain formation. Briefly studied the applicability of the Rotating Fluidized Bed to coal combustion. Presently conducting research in cyclic separation processes applicable to, but not confined to, isotopic separations.
Selected Publications	<p>Y. W. Wong and F. B. Hill, "Equilibrium and Kinetics Studies of Hydrogen Isotope Exchange in Vanadium Hydride," <u>AIChE Journal</u> 25, No. 4, 592-99 (1979).</p> <p>F. B. Hill, Y. W. Wong and Y. N. Chan, "Tritium Removal Using Vanadium Hydride," <u>15th DOE Nuclear Air Cleaning Conference Proceedings, Boston, Massachusetts, August 7-10, 1978, M. W. First, Editor, Vol. 1, 167-94 (1978).</u></p> <p>Robert Pfeffer and Frank B. Hill, "A Feasibility Study on the Use of a Rotating Fluidized Bed as a Dust Filter," BNL 50990, March 1979.</p>

MANNY HILLMAN	Chemist
Education	Brooklyn College (B.S. in Chemistry and Mathematics, 1949); Washington University (Ph.D. in Chemistry, 1953).
Research Interests	Organometallic Chemistry; Nuclear Chemistry; Numerical Analysis.
Professional Affiliations	American Chemical Society; American Physical Society; American Association for the Advancement of Science; Sigma Xi.
Summary of Experience	Performed a number of experimental and analytical investi- gations in nuclear chemistry, directed primarily toward radioisotopic production, including the development of isotope generators and the conceptual basis of the Brookhaven Linear Isotope Producer facility; published extensively on nuclear level densities and developed a code for the calculation of nuclear evaporation; developed charged particle (proton) X-ray excitation techniques, experimental apparatus and program for data reduction; participated in early stages of preparation of proposal for National Synchrotron Light Source; presently investi- gating unique photocatalytic properties of bridged ferro- cenes. Participation in Brookhaven Semester Program and Southampton College Intern Program.
Selected Publications	M. Hillman and E. Fujita, "Bridged Ferrocenes III. The Crystal and Molecular Structure of 1,1',2,2',3,4,4',4'- Tetrakis(trimethylene)ferrocene," <u>J. Organometal. Chem.</u> <u>155</u> , 99-108 (1978). L. D. Spaulding, M. Hillman and G. J. B. Williams, "Bridged Ferrocenes IV. The Crystal and Molecular Struc- ture of 1,1',2,2',3,3',4,5,4',5',-Pentakis(trimethylene)- ferrocene," <u>J. Organometal. Chem.</u> <u>155</u> , 109-16 (1978). M. Hillman and A. G. Nagy, "Bridged Ferrocenes V. Moessbauer Spectra - Squeezing the Iron Atom," <u>J. Organometal. Chem.</u> <u>184</u> , 433-45 (1980).

KUOCHIH HONG

Associate Chemist

Education

Taiwan Normal University (B.S. in Chemistry, 1965);
Tsing Hua University (M.S. in Chemistry, 1969); The
University of Chicago (Ph.D. in Chemistry, 1975).

Research Interests

Thermodynamics of Molten Salts, Liquid Alloys and Metal-
Nonmetal Binaries; Application of High Temperature
Calorimetry to the Gas-Solid Systems and Refractory
Materials.

Professional
Affiliations

American Chemical Society.

Summary of
Experience

Enthalpies of mixing measurement on binary liquid fluoride
mixtures, heats of formation studies on some refractory
materials (carbides and borides), kinetic studies of
hydrogen-deuterium exchange on metal surface, tritium
extraction from neutron-irradiated lithium compounds and
alloys, high temperature calorimeter construction, and
heats of mixing measurement on binary liquid alloys.

Selected
Publications

K. Hong and O. J. Kleppa, "New Application of High
Temperature Solution Calorimetry, II. Enthalpy of
Formation of B_4C at 1320 K," J. Chem. Thermodynamics **10**,
797 (1978).

K. Hong and O. J. Kleppa, "Thermochemistry of the Liquid
Mixtures of Aluminum Fluoride with Alkali Fluorides and
with Zinc Fluoride," J. Phys. Chem. **82**, 176 (1978).

K. Hong and O. J. Kleppa, "Thermochemistry of the Liquid
Mixtures of Rare Earth Fluorides with Alkali Fluorides,"
J. Phys. Chem. **83**, 2589 (1979).

JOHN R. JOHNSON

Chemistry Associate I

Education

University of Washington (B.S. in Chemistry, 1967); Brown University (Ph.D. in Physical - Inorganic Chemistry, 1973 and one year as a Postdoctoral Fellow in Bioinorganic Chemistry); University of California at Los Angeles (Postdoctoral Research Fellow in Physical - Inorganic Chemistry, March 1973 - October 1974).

Research Interests

Studies of the Physicochemical Properties of Metallic Metal Hydrides; Mobile and Stationary Applications of Reversible Metal Hydrides as Energy Storage Media; Inorganic Chemistry of Metal-Metal Bonded Transition Metal Cluster Compounds whose Properties Approximate Metallic Lattices.

Professional Affiliations

The American Chemical Society; Sigma Xi Scientific Fraternity.

Summary of Experience

Dr. Johnson has been employed at Brookhaven National Laboratory for over 5 years as a research chemist. During this period of time, he has been involved in research and development on hydrogen as a non-fossil based, renewable energy source. His research has been both fundamental and applied in nature and has centered on the safe and economic storage of hydrogen in the form of solid, reversible metal hydrides. He has been program manager (technical monitor) for several BNL/DOE subcontracts to industrial firms and universities. These subcontracts have dealt with the use of metal hydrides as energy storage media and for a variety of other applications.

Selected Publications

J. R. Johnson and J. J. Reilly, "Reaction of Hydrogen with the Low-Temperature Form (C15) of $TiCr_2$," Inorg. Chem. **17** 3103-8 (Nov. 1978).

J. R. Johnson and J. J. Reilly, "The Use of Manganese Substituted Ferrotitanium Alloys for Energy Storage," First International Conference on Alternative Energy Sources Proceedings, Miami Beach, Florida, Dec. 5-7, 1977.

G. D. Sandroek, J. J. Reilly and J. R. Johnson, "Interrelations between Phase Diagrams and Hydriding Properties of Alloys Based on the Intermetallic Compound $FeTi$," Workshop on Applications of Phase Diagrams in Metallurgy and Ceramics Proceedings, NBS, Washington, D.C., Jan. 10-12, 1977.

DAVID G. KEIL	Assistant Chemist
Education	Thiel College (A.B. in Chemistry, 1967); Carnegie-Mellon University (M.S. in Physical Chemistry, 1969; Ph.D. in Physical Chemistry, 1973); Postdoctoral Research Associate, University of Washington, 1973-1977.
Research Interests	Absolute Rates of Elementary Gas Phase Reactions; Intra- and Intermolecular Vibrational Energy Transfer.
Professional Affiliations	Sigma Xi.
Summary of Experience	Experience in the construction and use of discharge fast-flow reactor in the investigation of elementary gas phase atom and radical reactions. Responsible for the development of a technique to study high temperature unimolecular reactions and intermolecular energy transfer at low pressures. Also responsible for the design of associated experimental apparatuses. Experience in the use of lasers in studies of vibrational energy transfer from highly excited molecules.
Selected Publications	<p>D. G. Keil, J. F. Burkhalter and B. S. Rabinovitch, "Problems of Diffusion in a Low Pressure Gas Stream as Related to the Polanyi Diffusion Flame Method," <u>J. Phys. Chem.</u> <u>82</u>, 335 (1978).</p> <p>E. Kamaratos, J. F. Burkhalter, D. G. Keil and B. S. Rabinovitch, "Vibrational Energy Transfer in Thermal Unimolecular Systems by the Diffusion Cloud Method. Cyclopropane," <u>J. Phys. Chem.</u> <u>81</u>, 484 (1977).</p> <p>V. M. Donnelly, D. G. Keil and F. Kaufman, "Fluorescence Lifetime Studies of NO₂. III. Mechanism of Fluorescence Quenching," <u>J. Chem. Phys.</u> <u>71</u>, 659 (1979).</p>

R. BRUCE KLEMM

Chemist

Education

University of Maryland (B.S. in Chemistry, 1964; Ph.D. in Physical Chemistry, 1972); NASA-NRC Postdoctoral Research Associate, 1972-1974.

Research Interests

Experimental Gas Phase Kinetics; Combustion Chemistry; Chemical Dynamics; Theory of Chemical Reaction Rates.

Professional Affiliations

American Chemical Society; The Combustion Institute.

Summary of Experience

1975-Present: Principal Investigator for the Combustion Studies Program (BNL); responsible for the development of two experimental kinetics facilities, an engine laboratory (discontinued in 1979), and a flame probe experiment that will utilize the NSLS facility. 1972-1975: NASA-National Research Council Postdoctoral Research Associate at Goddard Space Flight Center, Maryland; involved in the construction and utilization of a flash photolysis-resonance fluorescence apparatus to measure bimolecular rate constants for elementary atom-molecule reactions; also performed fundamental photochemical experiments (quantum yields). 1971-1972: Teaching Assistant/Research Assistant at the University of Maryland. 1970-1971 and 1965-1968: Chemist at Gillette Research Institute, Rockville, Maryland; worked on various assignments in analytical chemistry and surface chemistry for several U.S. Government sponsored projects (NASA, NIDH, Navy). 1968-1970: Chemist at the Bureau of Commercial Fisheries (U.S. Dept. of Interior) College Park, Maryland, research station; performed routine analyses and developed a new analytical technique using a fluoride-ion selective electrode for determining fluoride ion in fish protein concentrate.

Selected Publications

R. B. Klemm, "Absolute Rate Parameters for the Reactions of Formaldehyde with O-atoms and H-atoms over the Temperature Range 250-500K," J. Chem. Phys. 79, No. 5, 1987-93 (Sept. 1979).

T. Tanzawa and R. B. Klemm, "A Modeling Study of the Reaction of (O^3P) with H_2CO ," 178th Annual Meeting of the American Chemical Society Proceedings, Washington, D.C., Sept. 9-14, 1979.

R. B. Klemm and E. G. Skolnik, "Absolute Rate Parameters for the Reaction of Ground State Oxygen Atoms with Acetaldehyde," ACS/CSJ Chemical Congress Proceedings, Honolulu, Hawaii, April 1-6, 1979.

JAMES F. LYNCH

Associate Chemist

Education	Holy Cross College (B.A. in Chemistry, 1971); University of Vermont (Ph.D. in Physical Chemistry, 1975); Brookhaven National Laboratory, Research Associate, 1975-1977.
Research Interests	Gas-metal Interactions, with emphasis on the Interaction of Hydrogen with Metals and the Heterogeneous Catalytic Reduction of C-O Compounds by Hydrogen over Metals.
Professional Affiliations	The American Chemical Society.
Summary of Experience	Thermodynamic aspects of the solution of hydrogen in a variety of metals have been examined at very high pressure ($p > 600$ atm) and at very low pressure ($p \leq 0.1$ mm Hg). Systems examined have ranged from pure metals to inter-metallic compounds, and techniques have ranged from calorimetry to X-ray diffraction. Catalytic aspects of the reduction of CO and CO ₂ to CH ₄ by hydrogen over inter-metallic compounds have been investigated in a continuous flow manner via gas chromatography.
Selected Publications	<p>J. F. Lynch, J. J. Reilly and F. Millot, "The Absorption of Hydrogen by Binary Vanadium-Chromium Alloys," <u>J. Phys. Chem. Solids</u> <u>39</u>, 883 (1978).</p> <p>J. F. Lynch and J. Tanaka, "The Dilute Solution of Hydrogen and Deuterium in β-Titanium," <u>Scripta Met.</u> <u>13</u>, 599-604 (1979).</p> <p>R. S. Sapienza, M. J. Sansone, L. D. Spaulding and J. F. Lynch, "Novel Interpretations of Carbon Oxide Reductions," in <u>Fundamental Research in Homogeneous Catalysis</u>, M. Tsutsui, Editor, Plenum Publishing Corp., New York, Vol. 3, 179 (1979).</p>

PAUL L. PICIULO	Assistant Chemist
Education	Cansius College (B.S., 1972); University of Notre Dame (M.S., 1975; Ph.D., 1977); Postdoctoral Research Associate, Brookhaven National Laboratory, 1977-1979.
Research Interests	Molecular Photophysics and Photochemistry; Kinetic Spectroscopy; Energy Conversion; Surface Chemistry and Computer Applications in Chemistry.
Professional Affiliations	American Chemical Society.
Summary of Experience	Research includes the photolysis of molecules in the adsorbed state. The behavior of transients in selected sorbate-sorbent systems, photoionization and charge transfer phenomena are under investigation. Fast kinetic spectroscopy and steady-state photolysis are the primary techniques used. Previous research includes the energy requirements for photoionization of arenes and substituted arenes in condensed micelles, polar solvents and dielectric liquids. Short lived transients in micellar systems were studied via laser photolysis, pulsed radiolysis and conventional flash photolysis.
Selected Publications	<p>Paul L. Piciulo and James W. Sutherland, "Flash Photolysis in the Adsorbed State," <u>178th American Chemical Society National Meeting Proceedings, Washington, D.C., September 10-14, 1979.</u></p> <p>P. L. Piciulo and J. W. Sutherland, "Flash Photolysis in the Adsorbed State: Pyrene on Porous Glass," <u>J. Amer. Chem. Soc. 101, 3123-25 (1979).</u></p> <p>J. K. Thomas and P. L. Piciulo, "Photoionization by Green Light," <u>J. Amer. Chem. Soc. 101, 2502 (1979).</u></p>

FRANZ REIDINGER	Assistant Physicist
Education	Julius Maximilians Universität Würzburg, West Germany (Vordiplom in Physics, 1966); State University of New York at Albany (M.Sc. in Physics, 1970; Ph.D. in Physics, 1979); Research Associate, Brookhaven National Laboratory, 1976-1979.
Research Interests	Structure of Disordered Solids, especially Superionic Conductors and Metal Hydrides.
Professional Affiliations	American Crystallographic Association.
Summary of Experience	Discovered defect structure of Na β -alumina that determines long term stability of different phases as solid electrolytes; collaborated on investigations of conduction mechanism in super ionic conductors α -AgI, Ag ₂ S and PbF ₂ ; structure investigations of ternary hydrides by neutron and X-ray powder diffraction; single crystal neutron diffraction studies of metal hydrides, H-H interaction and phase transitions in Group VA metal hydrides.
Selected Publications	<p>S. M. Shapiro and F. Reidinger, "Neutron Scattering Studies of Superionic Conductors," in <u>Topics in Current Physics</u>, M. B. Solamon, Editor, Springer-Verlag, Vol. 15, 45-75 (1979).</p> <p>F. Reidinger, J. J. Reilly, and R. W. Stoenner, "Single Crystal Preparation and Characterization of the Group VA Metal Hydrides and Deuterides," <u>J. Less Common Metals</u> 66, 24-32 (1979).</p> <p>P. Thompson, J. J. Reilly, F. Reidinger, J. M. Hastings, and L. M. Corliss, "Neutron Diffraction Study of γ Iron Titanium Deuteride," <u>J. Phys. F: Metal Phys.</u> 9, No. 4, 161-66 (1979).</p>

JAMES J. REILLY Chemist

Education Fordham University (B.S. in Chemistry, 1952).

Research Interests Metal Hydrides; Energy (Hydrogen) Storage.

Professional
Affiliations American Chemical Society; American Association for the
Advancement of Science.

Committees Organizing Committee for International Symposium on Metal
Hydrides, Colorado Springs, April 1980.

Summary of
Experience Present position, leader metal hydride group; co-author
of a number of papers on the properties of metal-hydrogen
systems, author of three review papers on the properties
and applications of useful metal hydrides; co-discoverer
of several metal hydride compounds that are currently
commercially produced for hydrogen storage applications,
co-awarded 14 patents, 9 of which are concerned with new
metal hydride compounds and/or their applications; earlier
experience was concerned with the development of methods
for reprocessing of nuclear fuel and the permanent storage
of radioactive wastes.

Selected
Publications J. J. Reilly and Gary D. Sandrock, "Hydrogen Storage in
Metal Hydrides," Scientific American 242, No. 2, 118-29,
(Feb. 1980).

P. Thompson, J. J. Reilly, F. Reidinger, J. M. Hastings
and L. M. Corliss, "Neutron Diffraction Study of γ Iron
Titanium Deuteride," J. Phys. F: Metal Phys. 9, No. 4,
161-65 (1979).

F. Reidinger, J. J. Reilly and R. W. Stoenner, "Single
Crystal Preparation and Characterization of the Group
VA Metal Hydrides and Deuterides," J. Less-Common Metals
66, 23-32 (1979).

PAUL F. RICHARDSON Associate Chemist

Education University of Rochester (B.S. in Chemistry, 1973; M.S. in Chemistry, 1975; Ph.D., in Physical Chemistry, 1978).

Research Interests Cation and Anion Radicals of Porphyrins; Magnetic Interaction between Organic Radicals and Transition Metals.

Professional Affiliations American Chemical Society.

Summary of Experience Numerous areas of spectroscopy, with emphasis in ESR, NMR and ENDOR spectroscopy.

Selected Publications P. F. Richardson, C. K. Chang, L. K. Hanson, L. D. Spaulding and J. Fajer, "π Cation Radicals of Isobacteriochlorins: Implications for Nitrite and Sulfite Reductases," J. Phys. Chem. 83, 3420-24 (1979).

 P. F. Richardson, C. K. Chang, L. D. Spaulding and J. Fajer, "Radicals of Isobacteriochlorins: Models of Siroheme and Sirohydrochlorin," J. Amer. Chem. Soc. 101, 7736-38 (Dec. 1979).

 Paul F. Richardson and Robert W. Kreilick, "Transition Metal Complexes with Radical Ligands: Pyridyliminonitroxide Radicals with Copper and Vanadium," Journal of Magnetic Resonance 29, 285-91 (1978).

RICHARD S. SAPIENZA Associate Chemist

Education State University of New York at Stony Brook (B.S. in Chemistry, 1969); University of Texas (M.A. in Organic Chemistry, 1971); University of Texas (Ph.D. in Inorganic Chemistry, 1976).

Research Interests Catalysis; Coal Chemistry; Metals Chemistry.

Professional Affiliations American Chemical Society (Fuel and Petroleum Divisions); Phi Lambda Upsilon.

Summary of Experience Involved in various aspects of transition metal chemistry, including the practical utilization of the catalytic hydrogenation of carbon monoxide (synthesis gas reactions), water's use as a hydrogen source through catalytic control of the water-gas shift reaction, the development of catalysts for methanol production and the oligomerization of dienes. Dr. Sapienza has proposed a novel mechanism for carbon oxide reaction, which has been applied to coal gas and combustion reactions, as well as for the understanding of metal oxidation and reduction chemistry. As Lecturer in Chemistry at the University of Connecticut, he taught, developed and administered the school's organic laboratories.

Selected Publications R. S. Sapienza, M. J. Sansone, L. D. Spaulding, and J. F. Lynch, "Novel Interpretations of Carbon Oxide Reductions," in Fundamental Research in Homogeneous Catalysis, M. Tsutsu, Editor, Plenum Publishing Corp., New York, Vol. 3, 179-197 (1979).

PETER SHERMAN

Research Associate

Education

University of Michigan (B.S. in Chemistry, 1970);
University of Oregon (Ph.D. in Chemical Physics, 1977);
Research Associate, Institute of Theoretical Science,
University of Oregon, spring-summer 1977; Postdoctoral
Fellow, State University of New York at Stony Brook,
1977-1979.

Research Interests

Optical and Electronic Properties of Organic and Organo-metallic Molecular Solids; Photoinduced Redox Reactions and Surface EM Wave Generation at the Interface of these Materials with Metals and Electrolytes; Solar Based Energy Conversion Technologies.

Summary of
Experience

Set up theoretical models for the energetics and for the rates of radiative and non-radiative decay of optical excitations in thin organic films, and also modelled the coupling of these excitations with plasmon modes at metal surfaces adjacent to the organic film. Investigated techniques for more efficiently calculating energies and lifetimes of scattering resonances in atomic systems and solids. Studied photo-excited redox processes in highly purified polyacene single crystals.

Selected
Publications

M. R. Philpott and P. Sherman, "Excitons and Polaritons in Monomolecular Layers," Phys. Rev. B12, 5381 (1975).

P. Sherman and M. R. Philpott, "Reflection of Light from Monomolecular Layers on Metal Surfaces," J. Chem. Phys. 68, 1729 (1978).

JOHN F. SMALLEY

Research Associate

Education

Rensselaer Polytechnic Institute (B.S. in Chemistry, 1970);
Rensselaer Polytechnic Institute (Ph.D. in Physical
Chemistry, 1975).

Research Interests

The Use of Flash Photolysis and Pulse Radiolysis to Study
Rapid Chemical Reactions; Halogen Atom Recombination
Reactions; Charge-Transfer Complexes; Solvated Electrons;
Interfacial Chemical Reactions; Lipid Bilayer Membranes.

Summary of
Experience

Studied the rate and mechanism for the recombination of
iodine atoms in dimethyl sulfide vapor. Also studied the
result of exciting the vapor phase molecular iodine-
dimethyl sulfide complex in its charge-transfer band.
Used both pulse radiolysis and flash photolysis to study
the solvation of electrons in low temperature alcoholic
glasses. Currently studying porphyrin photochemistry and
electron transfer reactions both in homogeneous solutions
and lipid bilayer membrane systems.

Selected
Publications

L. M. Perkey and J. F. Smalley, "Very Low Temperature
Pulse Radiolysis. Protiated and Perdeuterated Methanol
Glasses at 6K," J. Phys. Chem. 83, No. 23, 2959-64 (1979).

V. A. Brosseau, J. R. Basila, J. F. Smalley and R. L. Strong,
"Halogen Atom Charge-Transfer Complexes in the Vapor Phase,"
J. Amer. Chem. Soc. 94, No. 3, 716-19 (1972).

JAMES W. SUTHERLAND Chemist

Education University of Aberdeen (B.Sc., 1953, Honors);
University of London (Ph.D. in Physical Chemistry, 1956);
Imperial College of Science and Technology (D.I.C.,
1956); Associate Royal Institute of Chemistry, 1956;
University of Saskatchewan, NRC Postdoctoral Fellow,
1956-1958.

Research Interests Physical Chemistry: Photochemistry; Surface Chemistry;
Radiation Chemistry; Kinetics; Hydrazine Chemistry;
Sulphur Chemistry.

Professional American Chemical Society; The Chemical Society/Royal
Affiliations Institute of Chemistry.

Summary of Radiation Chemistry: radiolysis in aqueous solution,
Experience radiolysis in the adsorbed state; fission fragment
chemistry, pulse radiolysis, dosimetry. Surface
chemistry: adsorption and ion-exchange properties of
zeolites, physical adsorption, surface properties and
reactivity of carbons. Photochemistry: photolysis of
sulfur dioxide, photolysis of hydrazine, photolysis in
the adsorbed state, fast kinetic techniques. Research
Associate, Brookhaven National Laboratory, 1958-1960.
Scientist, The Morgan Crucible Company, 1960-1963.
Scientific Staff, Brookhaven National Laboratory,
1963-1980.

Selected L. D. Fogel and J. W. Sutherland, "Aerosol Formation on
Publications the Flash Photolysis of SO₂/Gas Mixtures," J. Phys. Chem.
70, 2775-88 (1979).

J. W. Sutherland, "Pulse Radiolysis of Aqueous Hydrazine
Solutions. The Triazene Species," J. Phys. Chem. 83,
789-95 (1979).

P. L. Picciulo and J. W. Sutherland, "Flash Photolysis in
the Adsorbed State: Pyrene on Porous Glass," J. Am.
Chem. Soc. 101, 3123-25 (1979).

TSUNEO TANZAWA

Research Associate

Education

Sophia University, Tokyo, Japan (B.E., 1969, M.E., 1971, with major in Chemistry and minor in Chemical Engineering); University of Texas at Austin (Ph.D. in Physical Chemistry, 1978); Postdoctoral Fellow, University of Texas at Austin, Austin, Texas, 1978-79.

Research Interests

Chemical Kinetics in Combustion and Environmental Systems.

Professional
Affiliations

Combustion Institute; American Chemical Society.

Summary of
Experience

In charge of undergraduate physical chemistry and quantum chemistry courses as an assistant instructor at the University of Texas at Austin. Translation and summarization of treatment technologies in Japan for acidic waste water containing heavy metals, carried out under a contract of EPA at Radian Corporation in Austin, Texas. Chemical kinetic and computer modeling studies of hydrocarbon combustion and pyrolysis and of formation of soot from acetylene in shocktube and/or fast flow tube reactors at the University of Texas at Austin and at Brookhaven National Laboratory.

Selected
Publications

T. Tanzawa and W. C. Gardiner, Jr., "Thermal Decomposition of Acetylene," 17th Symposium on Combustion Proceedings, Leeds, England, 1978; The Combustion Institute, 563, 1979.

D. B. Olson, T. Tanzawa, and W. C. Gardiner, Jr., "Thermal Decomposition of Ethane," Int. J. Chem. Kinet. 11, 23 (1979).

T. Tanzawa and R. B. Klemm, "A Modeling Study of the Reaction of $O(^3P)$ with H_2CO ," 178th Annual Meeting of American Chemical Society Proceedings, Washington, D.C., September 9-14, 1979.

YIU WAH WONG

Associate Chemical Engineer

Education

University of Ottawa (B.A.Sc. in Chemical Engineering);
Princeton University (M.A. in Chemical Engineering, 1972;
Ph.D. in Chemical Engineering, 1975).

Research Interests

Cyclic Separation Processes including Heatless Adsorption,
Thermal Swing Adsorption, Parametric Pumping and Cycling
Zone Adsorption; Thermodynamics and Kinetics of Adsorption
and Ion Exchange.

Professional
Affiliations

American Institute of Chemical Engineers, American
Chemical Society.

Summary of
Experience

Responsible for starting up a laboratory to conduct cyclic
separation processes research. Responsible for carrying
out studies of the thermodynamics and isotopic exchange
kinetics of the vanadium-hydrogen system, and the separa-
tions of hydrogen isotopes via pressure and thermal swing
processes using the aforementioned system.

Selected
Publications

Y. W. Wong and F. B. Hill, "Equilibrium and Kinetics
Studies of Hydrogen Isotope Exchange in Vanadium Hydride,"
AICHE Journal 25, No. 4, 592-99 (1979).

F. B. Hill, Y. W. Wong and Y. N. Chan, "Tritium Removal
Using Vanadium Hydride," 15th DOE Nuclear Air Cleaning
Conference Proceedings, Boston, Massachusetts, August
7-10, 1978, M. W. First, Editor, Vol. 1, 167-94 (1978).

METALLURGY AND MATERIALS

SCIENCE DIVISION

M. SUENAGA

JAMES R. BETHIN

Assistant Scientist

Education

University of Rochester (B.S. in Physics, 1972); University of Illinois (M.S. in Physics, 1974); University of Illinois (Ph.D. in Ceramic Engineering, 1979); NRC Post-doctoral Research Associateship, National Bureau of Standards, 1979-1980.

Research Interests

Hydrides and Hydrogen in Metals; Ionic and Electronic Conduction in Polycrystalline Solids; Surface Studies; Catalysis; Crystal Defects.

Professional Affiliations

American Physical Society; American Ceramic Society.

Summary of Experience

Investigated oxygen-ion conduction in polycrystalline yttria-doped CeO_2 and an electrode-surface effect in Sr-doped LaCrO_3 using, in part, an ac impedance technique to separate various conduction and relaxation phenomena. Previously studied hydrogen oxidation and chemisorption by nonstoichiometric transition metal carbides with surface-sensitive techniques and electrochemical and calorimetric methods. Investigated semiconductor-metal transition in variously-doped silicon single crystals by liquid-helium temperature dielectric measurements.

Selected Publications

J. Bethin and W. S. Williams, "Electrocatalysis by Non-stoichiometric Transition Metal Carbides", 80th Annual Meeting of American Ceramic Society, Cincinnati, OH, Apr. 30, 1979.

J. Bethin and W. S. Williams, "Ambipolar Diffusion Contributions to High-Temperature Thermal Conductivity of Titanium Carbide", J. of the American Ceramic Society 60, 424-27 (1977).

J. Bethin, T. G. Castner, and N. K. Lee, "Polarizabilities of Shallow Donors in Silicon", Solid State Communications 14, 1321-24 (1974).

REED R. CORDERMAN	Assistant Scientist
Education	Case Western Reserve University (B.A. in Chemistry, 1973); California Institute of Technology (Ph.D. in Physical Chemistry, 1977); Postdoctoral Research Associate, Joint Institute for Laboratory Astrophysics, University of Colorado and National Bureau of Standards, 1977-1979.
Research Interests	Mass Spectrometry and Laser Spectroscopy of Electrical Discharges; Mechanisms of Thin Film Growth by Plasma and Pyrolytic Deposition.
Professional Affiliations	American Society for Mass Spectrometry; American Chemical Society; American Physical Society.
Summary of Experience	Dr. Corderman has most recently constructed an atomic and molecular beam source of metal-containing negative ions. This source and the techniques of laser photodetachment spectroscopy were used to observe the low-lying electronic states and characteristic vibrational frequencies of these ions. These measurements directly give structural information and electron affinities of metal atoms and molecules, and are useful to those concerned with magnetohydrodynamic (MHD) power generation. Previously, Dr. Corderman investigated the ion-neutral reaction chemistry of transition metal ions with a wide variety of chemical substances. The energetics of transition metal ion--ligand bonding, novel chemical reactions, and gas phase analogues to catalytic processes were studied.
Selected Publications	<p>R. R. Corderman and W. C. Lineberger, "Negative Ion Spectroscopy", <u>Annual Review of Physical Chemistry</u> <u>30</u>, 347-378 (1979).</p> <p>J. L. Beauchamp, A. E. Stevens, and R. R. Corderman, "Chemistry without Solvents: Properties and Reactions of Organometallic Complexes in the Gas Phase", <u>Pure and Applied Chemistry</u> <u>51</u>, 967-978 (1979).</p> <p>R. R. Corderman, P. C. Engelking, and W. C. Lineberger, "Laser Photoelectron Spectrometry of Co⁻ and Ni⁻", <u>J. of Chemical Physics</u> <u>70</u>, 4474-4480 (1979).</p>

ALAN E. DELAHAY Assistant Scientist

Education University of Oxford (B.A. in Physics, 1971; M.A., 1976); Rutgers University (M.S. in Electrical Engineering, 1975; Ph.D. in Electrical Engineering, 1979).

Research Interests Thin-Film Photovoltaics; Plasma Deposition Techniques; Impurity Effects and Electronic Processes in Plasma-Deposited Amorphous Semiconducting Alloys and their associated Devices; Thermoelectric Power of Hydrogenated Amorphous Silicon.

Professional Affiliations Institute of Physics (UK); American Physical Society; American Vacuum Society; Institute of Electrical and Electronics Engineers; American Association for the Advancement of Science, Sigma XI; New York Academy of Sciences.

Summary of Experience Responsible (with Professor W. A. Anderson) for the development of high-efficiency MIS solar cells on single-crystal, ribbon, and polycrystalline silicon. First comparative study of spectral response of such cells. Study of columnar growth and conduction mechanisms in high-purity silicon films deposited by electron-beam evaporation onto oxide-free aluminum layers; model of radiative heat exchanges. Matrix analysis of absorbing multilayer optical systems, including new result for transmission at an interior interface. Theory of heat-mirror type solar thermal collectors using wavelength-selective coatings.

Selected Publications S. K. Dey, W. A. Anderson, A. E. Delahoy, and C. Cartier, "Spectral Response and Diffusion Length Studies of Amorphous, Polycrystalline, Ribbon, Epitaxial and Single-Crystal Silicon MIS Solar Cells", J. Appl. Phys. 50, 4425-4430 (1979).

S. K. Dey, A. E. Delahoy, and W. A. Anderson, "Heat Transfer and Columnar Growth in Electron-Beam Evaporation of Silicon Films for Solar Cell Applications", J. Vac. Sci. Technol. 1739-1745 (1978).

W. A. Anderson, A. E. Delahoy, J. K. Kim, S. L. Hyland, and S. K. Dey, "High-Efficiency Cr-MIS Solar Cells on Single and Polycrystalline Silicon", Appl. Phys. Lett. 33, 588-590 (1978).

DERSHIN GAN	Assistant Metallurgist
Education	National Taiwan University (B.S. in Physics, 1972); Northwestern University (Ph.D. in Materials Science and Engineering, 1980).
Research Interests	Mechanical Properties; Fatigue Crack Propagation; Creep, Fracture Toughness.
Professional Affiliations	American Society for Metals
Summary of Experience	Conducted research in fatigue crack closure phenomenon and its relation with fatigue crack propagation rate for a better method to predict fatigue life.
Selected Publications	D. Gan and J. Weertman, "Crack Closure in 7050-T76 Aluminum Alloy", <u>108th AIME Annual Meeting, New Orleans, LA, Feb. 18-22, 1979.</u>

MEYER GARBER

Physicist

Education

University of Pennsylvania (B.S. in Electrical Engineering, 1949); University of Illinois (Ph.D. in Physics, 1954); Postdoctoral Fellow, Kamerlingh Onnes Lab., Univ. of Leiden, Holland, 1954-1955; Postdoctoral Fellow, National Research Council of Canada, Ottawa, 1955-1957.

Professional Affiliations

American Physical Society; American Association for the Advancement of Science.

Committees

American Society for Testing Materials: Standards for Superconductors.

Summary of Experience

University of Illinois, Thesis subject; Properties of Superconductors. Kamerlingh Onnes Lab., Postdoctoral: Spin Resonance in Antiferromagnetic Crystals. National Research Council, Ottawa, Postdoctoral: Magnetic Susceptibility of Metals and Alloys. Michigan State Univ., Associate Professor: Magnetic and transport properties of metals and alloys, susceptibility of antiferromagnetic crystals. MIT, Research Associate: Specific heat and susceptibility of superconductors at low temperatures. Brookhaven National Laboratory, Physicist: Studies on superconductors, susceptibility of solid helium at very low temperatures; design and test of superconductive power transmission cables.

Selected Publications

M. Garber, J. F. Bussiere, and G. H. Morgan, "Design of Double Helix Conductors for Superconducting ac Power Transmission", First Joint MMM-INTERMAG Conf., Pittsburgh, PA, June 15-18, 1976; Published as AIP Conf. Proc. 34, 84-87.

M. Suenaga, J. F. Bussiere, and M. Garber, "Effect of Metallurgical Treatments on ac Losses of Nb₃Sn Produced by Solid State Diffusion", Advances in Cryogenic Engineering 22, Editors K. D. Timmerhaus, R. P. Reed and A. F. Clark, Plenum Publishing Corp., New York, 326-331 (1977).

M. Garber, "A 10 m Nb₃Sn Cable for 60 Hz Power Transmission", IEEE Trans. on Magnetics MAG-15, 155-158 (1979).

RICHARD W. GRIFFITH Physicist

Education California Institute of Technology (B.S. in Engineering and Physics, 1963); California Institute of Technology (Ph.D. in Physics and Applied Mathematics, 1969); Post-doctoral Research Fellow, Argonne National Laboratory, 1969-1971.

Research Interests Materials Sciences and Physics, including Genre of Optoelectronic Amorphous Semiconductor Materials and Devices, Plasma Chemistry, Quantum Field Theory, and Statistical Mechanics; Program Management, including Program Development, Technical Management, and Technology Policy.

Professional Affiliations American Association for the Advancement of Science; American Institute of Physics (Forum on Physics and Society, and Division of Condensed Matter Physics); International Solar Energy Society; American Vacuum Society; Metallurgical Society of AIME (Electronic Materials).

Summary of Experience Program Leader and Physicist, Brookhaven National Laboratory (1977-present): program management involves developing technical and funding scope of Solar Materials Program, and management of same. Dr. Griffith also acts as informal advisor to the Photovoltaics Program Office/SERI. Active research on optoelectronic amorphous semiconductor films and devices, and plasma chemistry.

Staff Physicist, Argonne National Laboratory (1975-1977): Developed amorphous semiconductor coatings program for solar thermal conversion. Earlier carried out energy budget studies for twenty-two state region, and helped begin program on energy storage system analysis.

Research Associate Professor, Universität Bonn, West Germany (1971-1975): Carried out research in high-energy physics.

Selected Publications R. W. Griffith, "Fundamental Aspects of Amorphous Semiconductors in Solar Thermal Conversion", Seventh Int. Conf. on Amorphous and Liquid Semicond., Edinburgh, Scotland, June 27-July 1, 1977.

R. W. Griffith, "Polar Contribution to Temperature Variation of the Mobility Gap", J. Non-Crys. Solids **27**, 285-287 (1978).

R. W. Griffith, F. J. Kampas, P. E. Vanier, and M. D. Hirsch, "Modifications in Optoelectronic Behavior of Plasma-Deposited Amorphous Semiconductor Alloys via Impurity Incorporation", Eighth Int. Conf. on Amorphous and Liquid Semicond., Cambridge, MA, Aug. 27-31, 1979.

STEVE M. HEALD

Assistant Scientist

Education

University of Washington (B.S. in Physics, 1972);
University of Illinois (M.S. in Physics, 1973);
University of Illinois (Ph.D. in Physics, 1976);
Research Associate, University of Washington,
1976-1979.

Research Interests

Using EXAFS to Study Materials; Applications of
Synchrotron Radiation; Intercalated Graphite.

Professional
Affiliations

American Physical Society.

Summary of
Experience

General experience in the applications of x-rays in
materials research including the use of EXAFS to study
surface systems, amorphous materials, intercalation
compounds and biological systems; x-ray diffraction
studies of defects; general knowledge of low tempera-
ture techniques including dilution refrigeration;
involved in the design of Synchrotron radiation beam-
lines.

Selected
Publications

E. A. Stern, S. M. Heald, and B. Bunker, "The Ampli-
tude of the Extended X-Ray Absorption Fine Structure
in Bromine Molecules", Phys. Rev. Lett. 42, 1372 (1979).

S. M. Heald, E. A. Stern, B. Bunker, E. M. Holt, and
S. L. Holt, "Structure of the Iron-Containing Core in
Ferritin by the Extended X-Ray Absorption Fine Struc-
ture Technique", J. Am. Chem. Soc. 101, 67 (1979).

S. M. Heald and E. A. Stern, "EXAFS Study of the Br₂-
Graphite System", Phys. Rev. B 17, 4069 (1978).

MITCHELL D. HIRSCH	Research Associate
Education	University of California at Los Angeles (B.S. in Physics, 1969); Cornell University (M.S. in Physics, 1972, Ph.D. in Physics, 1980); Postdoctoral Fellow, University of Pennsylvania, 1977-1979.
Research Interests	Optical Phenomena in Solids; Solid State Spectroscopy; Applications of Lasers to Research in Solid State Physics and Chemistry.
Professional Affiliations	American Physical Society
Summary of Experience	Developed techniques for observing emission and coherent optical phenomena on the picosecond time scale. Used these techniques for studies of very fast optical phenomena in crystals and solutions. Was largely responsible for setting up a picosecond-pulse laser laboratory at the University of Pennsylvania. Currently investigating optical phenomena in amorphous semiconductors with applications to development of photovoltaic solar cells.
Selected Publications	<p>M. D. Hirsch and H. Mahr, "Luminescence Decay Kinetics of Malachite Green on a Picosecond Time Scale", <u>Chem. Phys. Letters</u> <u>60</u>, 299 (1979).</p> <p>R. W. Griffith, F. J. Kampas, P. E. Vanier, and M. D. Hirsch, "Modifications in Optoelectronic Behavior of Plasma-Deposited Amorphous Semiconductor Alloys via Impurity Incorporation", <u>Eighth International Conference on Amorphous and Liquid Semiconductors, Cambridge, MA, Aug. 27-31, 1979.</u></p> <p>R. W. Griffith, M. D. Hirsch, F. J. Kampas, and P. E. Vanier, "Advanced Amorphous Materials for Photovoltaic Conversion", BNL 51145, October 1979.</p>

SUN-KEUN HWANG

Assistant Metallurgist

Education

Seoul National University, Seoul Korea (B.S. in Metallurgical Engineering); University of California, Berkeley (M.S. and Ph.D. in Materials Science and Engineering, 1974 and 1977); Postdoctoral Research Engineer, Lawrence Berkeley Laboratory, University of California, 1977-1978.

Research Interests

Structure and Properties of Metals; Analysis of the Effect of Microstructure on the Fracture Toughness of Alloys.

Professional Affiliations

American Society of Metals.

Summary of Experience

Responsible for the investigation of the effect of microstructural development during high temperature deformation on the fracture toughness of metal alloys (for the U.S. Dept. of Energy). Also for the Dept. of Energy, the development of cryogenic structural alloys using solid state phase transformation. Responsible for the invention of Fe-12Mn-B alloy for low temperature applications. Technical experiences in analytic microscopy, electron spectroscopy, mechanical testings at high and low temperatures.

Selected Publications

S. K. Hwang and J. W. Morris, "The Improvement of Cryogenic Mechanical Properties of Fe-12Mn and Fe-8Mn Alloy Steels Through Thermal/Mechanical Treatments", Metallurgical Transactions 10A, 545-554, (May 1979).

J. W. Morris, Jr., S. K. Hwang, K. A. Yushchenko, V. I. Belotserkovetz, and O. G. Kvasnevskii, "Fe-Mn Alloys for Cryogenic Use: A Brief Survey of Current Research", Advances in Cryogenic Engineering 24, 91-102 (1978).

S. K. Hwang, S. Jin, and J. W. Morris, "A Study of Retained Austenite in a Fine-Grained Fe-12Ni-0.25 Ti Alloy", Metallurgical Transactions 6A, 2015-2021 (Nov. 1975).

OTTO F. KAMMERER	Metallurgist
Education	University of Alabama (B.S. in Metallurgical Engineering, 1941); Polytechnic Institute of Brooklyn (M.S. in Metallurgical Engineering, 1950); New York University (All Class Credits Completed for Ph.D., 1950-1958).
Research Interests	Mainly Support Work or Service Work in Metallography and X-Ray for Research Projects; Superconductivity, LEED and Auger, Surface Analysis.
Professional Affiliations	International Metallographic Society; Sigma Xi.
Summary of Experience	U.S. Steel, 1941-1943; U.S. Army, 1943-1945; Western Electric Co., 1945-1948; Brookhaven National Laboratory, 1948-Present. Hired at BNL to establish and supervise a metallography and x-ray laboratory. Twelve years of this period worked on superconductivity research. Present interest is metallography and x-ray work.
Selected Publications	<p>J. A. Strozier, O. F. Kammerer, and M. Strongin, "Alloys of Sn and Ge on Nb Surfaces", <u>Jnl. Appl. Phys.</u> <u>47</u>, No. 4 (April 1976).</p> <p>H. Lutz, H. Wiesmann, O. F. Kammerer, and M. Strongin, "Correlations between the Transition Temperature of Nb₃Ge and the Normal State Resistivity", <u>Phys. Rev. Letters</u> <u>36</u>, No. 26 (June 1976).</p> <p>H. Wiesmann, M. Gurvitch, A. Ghosh, H. Lutz, O. F. Kammerer, and M. Strongin, "Estimate of the Density of States Change with Disorder in Al₅ Superconductors", <u>Phys. Rev. B</u> <u>17</u>, 122-125 (1978).</p>

FRANK J. KAMPAS	Assistant Scientist
Education	University of Pennsylvania (B.A., M.S. in Physics, 1968); Stanford University (Ph.D. in Physics, 1974); Postdoctoral Research Associate, University of Washington, 1974-1977.
Research Interests	Deposition and Characterization of Thin Films (Inorganic and Organic) for Opto-Electronic Applications; Electronic Structure and Interactions of Molecules.
Professional Affiliations	American Physical Society
Summary of Experience	I am currently using optical spectroscopy to study the deposition of hydrogenated amorphous silicon films for photovoltaic applications in order to understand how the deposition conditions determine the electrical properties of the films produced. Prior to that I studied the optical, electrical, and photovoltaic properties of thin films of organic compounds in order to study energy and charge car- rier migration. My thesis work was a study of electro- static solute-solvent interactions between organic dyes and hydrogen bonding solvents.
Selected Publications	A. D. Adler, F. R. Longo, and F. J. Kampas, "Solid State Phenomena in Porphyrins and Related Materials", in <u>The Porphyrins</u> , Vol. V, David Dolphin, ed., Academic Press, 1978. F. J. Kampas and M. Gouterman, "Porphyrin Films V, Strongly Fluorescent Films", <u>J. Luminescence</u> 17, 439 (1978). F. J. Kampas and M. Gouterman, "Porphyrin Films IV, Electroluminescence of Octaethylporphin", <u>Chem. Phys. Lett.</u> 48, 233 (1977).

CARL J. KLAMUT	Metallurgist
Education	New York University (BSME, 1951).
Research Interests	Materials Development and Evaluation; Mechanical and Physical Testing of Metals and Nonmetals; Compatibility of Materials with Liquid Metals, Welding, Quality Control, Failure Analysis.
Professional Affiliations	American Society for Metals; American Society for Testing Materials.
Summary of Experience	Group Leader of the Materials Development Section responsible for design, fabrication and operation of large scale systems used to evaluate the corrosion resistance of materials to liquid metals such as bismuth, sodium, cesium, etc. Responsible for evaluating the properties of composite glass/polymer materials for use as rock bolts in coal mines and also investigating the properties of concrete/polymer materials. Involved in the development of low loss Nb ₃ Sn superconducting tapes for Power Transmission Lines and responsible for commercial development of these tapes. Developed welding and quality control procedures for HFBR components. Leader of the Metallurgical Services Group which provides materials fabrication and evaluation, metallographic, electron microscope, microprobe and x-ray analysis. Involved in failure analysis and materials recommendations for various laboratory facilities.
Selected Publications	<p>M. Suenaga, C. Klamut, and J. F. Bussiere, "ac Loss and dc Critical Current Densities of Nb₃Sn Tapes by the Solid State Diffusion Process", <u>IEEE Transactions on Magnetics</u> MAG-13, No. 1 (1977).</p> <p>T. Luhman, M. Suenaga, and C. Klamut, "Influence of Tensile Stresses on the Superconducting Temperature of Multifilamentary Nb₃Sn Composite Conductors", <u>Advances in Cryogenic Engineering</u> 24 (1977).</p> <p>J. Bussiere, V. Kovachev, C. Klamut, and M. Suenaga, "Nb₃Sn Conductors for ac Power Transmission:Electrical and Mechanical Characteristics", <u>Advances in Cryogenic Engineering</u> 24 (1977).</p>

THOMAS LUHMAN

Associate Metallurgist

Education

Washington State University (B.S., Physical Metallurgy, 1965); University of Washington (M.S., Metallurgical Engineering, 1967); University of Washington (Ph.D., Metallurgical Engineering, 1970); Postdoctoral Fellow, Simon Fraser University, Vancouver, B.C., Canada, 1970-1972.

Research Interests

Physical Metallurgy and Materials Science; Basic and Applied Research in the Areas of Superconducting Devices and Alloys and the Mechanical and Electrical Properties of Composite Superconductors.

Professional Affiliations

American Physical Society; Metallurgical Society of the AIME; American Society of Metals.

Summary of Experience

Responsible for an applied research project investigating the mechanical and electrical properties of composite superconductors. This project is sponsored by the Office of Fusion Energy, Department of Energy, Washington, DC and its focus is the development of a practical conductor for use in superconducting magnets. Now processes are sought for the manufacture of superconducting wires and cables, the improvement of intrinsic properties of existing composite conductors within the scope of present manufacturing methods, and the development of new materials with improved properties.

Selected Publications

Thomas Luhman and David Dew-Hughes, eds. of Metallurgy of Superconducting Materials, Academic Press, New York (June 1979).

Thomas Luhman and D. O. Welch, "An Analysis of Critical Current-Bend Strain Relationships in Composite Nb₃Sn Superconducting Wires," Eighth Symposium on Engineering Problems of Fusion Research, San Francisco, CA, Nov. 16-18, 1979.

Thomas Luhman, "Increases in the Allowable Strain Limits for Nb₃Sn Wire Conductors by Alloying the Bronze Matrix with Beryllium", J. Appl. Phys. 50, No. 5, 3766-3767 (May 1979).

ALBERT C. MULLER	Associate Chemist
Education	Hofstra University (B.Sc. in Physics, 1954, M.Sc. in Physics, 1961).
Research Interests	Energy Transmission; Development of Cryogenic Dielectric Insulation.
Professional Affiliations	The Institute of Electrical and Electronics Engineers; The Society of Plastics Engineers; The Inter-Society Color Council; The American Society for Psychical Research.
Summary of Experience	Presently developing plastic dielectric tapes for use with both superconducting power transmission cables and ambient temperature oil-filled power cables. Designed a nondestructive radiographic method for examining the internal structure of lapped high voltage power cables. Developed several solid-state radiation dosimeters in support of the food radiation pasteurization and radiation sterilization programs.
Selected Publications	<p>E. B. Forsyth, A. J. McNerney, A. C. Muller, "Performance of Synthetic Materials in the Lapped Insulation of Cryogenic and Ambient Temperature Cables", <u>Proceedings of the IEEE/PES Conference and Exposition on Overhead and Underground Transmission and Distribution, Atlanta, GA, April 1-6, 1979.</u></p> <p>E. B. Forsyth, A. J. McNerney, A. C. Muller, "The Development of Synthetic Insulating Tape for EHV Cables", <u>Proceedings of the Second IEE International Conference on Progress in Cables and Overhead Lines for 220 kV and Above, London, England, September 4-6, 1979.</u></p> <p>A. C. Muller, "X-Ray Examination of Insulation in Lapped High Voltage Underground Power Transmission Cables", <u>Proceedings of the National Fall Conference of the American Society for Nondestructive Testing, St. Louis, MO, Oct. 15-18, 1979.</u></p>

CHANDRA S. PANDE	Metallurgy Associate I
Education	Delhi University (B.S. [Honors] in Physics, 1959; M.A. in Physics, 1961); Cambridge University, Oxford University (Ph.D. in Physical Metallurgy, 1970); Postdoctoral Fellow, Lehigh University, 1971-1974.
Research Interest	Electron Microscopy, Applied to Materials Science. Corrosion, Hydrides, Radiation Damage in Superconductors, Mechanical Properties of Materials.
Professional Affiliations	American Association for the Advancement of Science; Electron Microscopy Society of America; Microbeam Society of America, The Metallurgical Society of AIME.
Committees	Publications Review Committee of SEM (Scanning Electron Microscopy) Incorporated.
Summary of Experience	Introduced the application of analytical electron microscopy to the study of corrosion, especially in stainless steel. Responsible for several theoretical and experimental studies of radiation damage in superconductors. Authored two chapters in Treatise on Material Science and Technology series on bicrystals (Vol. 8) and electron microscopy and superconductivity (Vol. 14), respectively. Developed a novel and unique technique of growing large bicrystals of niobium. Developed analytical techniques for the study of interface problem in anisotropic materials. Developed a technique of studying the dissolution and subsequent emission (on heating) of hydrogen in FeTi using electron microscopy.
Selected Publications	<p>C. S. Pande, "Superconductivity and Electron Microscopy", <u>Treatise on Materials Science and Technology</u> <u>14</u>, 171-219 (1979).</p> <p>C. S. Pande and M. A. Pick, "High Voltage Electron Microscopy of Hydrogen Dissolution in FeTi", <u>Proc. Thirty-Seven Annual Conf. on Electron Microscopy</u>, 432 (1979).</p> <p>C. S. Pande, "Transmission Electron Microscopy of Radiation Damage in Nb₃Sn", <u>Phys. Stat. Sol.</u> <u>52</u>, 607 (1979).</p>

MICHAEL A. PICK	Associate Scientist
Education	Technische Universität München (Diploma in Physics, 1969); Technische Hochschule Aachen (Ph.D. in Physics, 1973).
Research Interests	Physical Metallurgy and Materials Science; Hydrogen and Other Interstitials in Metals; Surface Studies especially related to the Influence of Surfaces on Hydriding Properties; X-Ray, Neutron, γ -Ray and Electron Diffraction; EXAFS and Topography.
Professional Affiliations	The International Association for Hydrogen Energy; The American Physical Society.
Summary of Experience	Scientist at the Kernforschungsanlage Jülich, Germany (1969-1977). Involved mainly in the study of hydrogen in metals using a wide range of techniques and materials. Responsible for an x-ray characterization group utilizing numerous x-ray and γ -ray techniques. Consultant at IBM Development Laboratories, Fishkill, NY (1973-1974). Studied and applied x-ray topography to semiconductor research. Brookhaven National Laboratory (1977-Present, Assistant then Associate Scientist). Present research includes work on phase equilibria and hydrogen trapping in dilute alloys; surfaces of Nb, V, and Ta and the influence of overlayers of a second layer on hydriding kinetics; EXAFS on metal hydrogen and other metal-interstitial systems.
Selected Publications	<p>P. Thompson, M. A. Pick, F. Reidinger, L. M. Corliss, J. M. Hastings, and J. J. Reilly, "Neutron Diffraction Study of β-Iron-Titanium Deuteride", <u>J. Phys. F: Metal Phys.</u> <u>8</u>, 175-79 (1978).</p> <p>M. A. Pick and D. O. Welch, "Hydrogen Absorption in the Niobium-Vanadium System", <u>Z. für Phys. Chem NF</u> <u>114</u>, 39-45 (1979).</p> <p>M. A. Pick, F. W. Davenport, Myron Strongin, and G. J. Dienes, "Enhancement of Hydrogen Uptake Rates for Nb and Ta by Thin Surface Overlayers", <u>Phys. Rev. Letters</u> <u>43</u>, 386 (1979).</p>

ROBERT L. SABATINI Metallurgy Associate II

Education State University of New York at Stony Brook (B.S. in Earth and Space Sciences, 1972); South Dakota School of Mines (Completed 22 Credits in Geology and Chemistry, 1972-1973); State University of New York at Stony Brook (Graduate Courses in Materials Science, 1978-Present).

Research Interests Scanning and Electron Microscopy of Materials; X-Ray Microanalysis of Bulk and Thin Foils.

Professional Microbeam Analysis Society
Affiliations

Summary of Responsible for all SEM studies in Materials Science
Experience Division, including characterization of surfaces which have failed due to creep and fatigue. Qualitative and quantitative analysis of experimental alloys and compounds. One of the principal investigators in an AEM study of sensitized type 304 stainless steel, looking at Cr-depletion adjacent to the grain boundaries. Also, involved in computer programming for data reduction.

Selected R. L. Sabatini and C. S. Pande, "A Comparison of Pro-
Publications cedures for Quantitative X-Ray Analysis in Thin Films", Proceedings of the 14th Annual Conference of the Microbeam Analysis Society, San Antonio, Texas, Aug. 12-17, 1979.

C. L. SNEAD, Jr. Associate Physicist

Education University of Richmond (B.S. in Physics, 1959); University of North Carolina at Chapel Hill (Ph.D. in Physics, 1965); Postdoctoral Fellow in Physics, University of North Carolina at Chapel Hill, 1965; Postdoctoral Fellow in Materials Science, Northwestern University, 1965-1967.

Research Interests Experimental Investigation of Properties of Defects in Materials.

Professional Affiliations American Physical Society; AIME; Associate Editor, Physical Review.

Committees Nuclear Metallurgy Committee of The Metallurgical Society of the AIME; Publications Committee of the American Institute of Physics.

Summary of Experience Investigation of radiation-induced defects in several metals using internal-friction techniques; application of new technique of positron annihilation spectroscopy to several defect problems in many different materials; investigation of role of radiation damage to critical properties of high-field superconductors.

Selected Publications A. R. Sweedler, C. L. Snead, Jr., and D. E. Cox, "Irradiation Effects in Superconducting Materials", Treatise on Material Science and Technology: Metallurgy of Superconducting Materials, Editors Thomas Luhman and David Dew-Hughes, Academic Press, New York 14, 349-426 (1979).

C. L. Snead, Jr. and M. Suenaga, "Radiation-Enhanced-Diffusion Growth of Nb₃Sn Monofilaments: Grain-Size Effects on Critical-Current Density", Applied Physics Letters 36, 225 (1980).

C. L. Snead, Jr., A. N. Goland, K. G. Lynn, Y. Platov, and M. Guinan, "Positron Trapping by Defects in Pt, Al, and Al-0.1-at.% Mg Following d-Be Neutron Irradiation", Proc. Intern. Conf. Positron Annihilation, Lake Yamanaka, Japan, R. R. Hasiguti and K. Fujiwara, Editors, April 1979, The Japan Institute of Metals, Sendai 980, Japan, 725-730 (1979).

PETER E. VANIER	Assistant Scientist
Education	Cambridge University (B.A. in Natural Science, 1967); Syracuse University (M.S. in Metallurgy 1969; Ph.D. in Physics, 1976); Postdoctoral Research Associate, Yeshiva University, 1976-1978.
Research Interests	Solar Cell Materials; Electro-Optical Properties of Semiconductors; Preparation and Characterization of Thin Films.
Professional Affiliations	American Physical Society; Sigma Xi.
Summary of Experience	At present using photoconductivity and photoluminescence measurements to study the electronic properties of hydro- genated amorphous silicon. These techniques provide the primary evaluation of this material which can be produced under a variety of conditions. The aim is to optimize the semiconductor properties for solar photovoltaic ap- plications. Also involved in designing an improved glow discharge deposition system for producing films with very low impurity content. Have previously worked on liquid phase epitaxial growth of HgCdTe alloys for use in infra- red detectors, and spin dependent luminescence in silicon at low temperatures and high magnetic fields.
Selected Publications	<p>R. W. Griffith, F. J. Kampas, P. E. Vanier, and M. D. Hirsch, "Modifications in Optoelectronic Behavior of Plasma Deposited Amorphous Semiconductor Alloys via Impurity Incorporation", <u>Proceedings of the 8th Inter- national Conference on Amorphous and Liquid Semiconductors</u>, Cambridge, MA, Aug. 27-31, 1979.</p> <p>P. E. Vanier, Fred H. Pollak, and Paul M. Raccach, "Cur- rent Controlled Liquid Phase Epitaxy of $Hg_{1-x}Cd_xTe$", <u>J. of Electronic Materials</u> <u>9</u>, No. 1, 153-164 (Jan. 1980).</p> <p>P. E. Vanier, Fred H. Pollak, and Paul M. Raccach, "Topo- graphical Investigation of the Variations in Stoichiom- etry in $Hg_{1-x}Cd_xTe$ Using Electrolyte Electroreflectance", <u>Applied Optics</u> <u>16</u>, No. 11, 2858-60 (Nov. 1977).</p>

DAVID O. WELCH	Physicist
Education	University of Tennessee (B.S. in Metallurgy, 1960); Massachusetts Institute of Technology (S.M. in Metallurgy, 1962); University of Pennsylvania (Ph.D. in Materials Science, 1964); NATO Postdoctoral Fellow, United Kingdom Atomic Energy Research Establishment, Harwell, England, 1965.
Research Interests	Theoretical Materials Science; Crystal Lattice Defects and Mass Transport; Superconducting Materials.
Professional Affiliations	American Physical Society; American Association for the Advancement of Science; Sigma Xi.
Summary of Experience	Assistant Professor, Princeton University; Visiting Professor, University of Sao Paulo; Visiting Lecturer, SUNY-Stony Brook; Visiting Scientist and/or Consultant: Oak Ridge National Laboratory, Argonne National Laboratory, KFA-Julich (West Germany). From Associate Physicist to Physicist, Brookhaven National Laboratory. Activities in the above consisted of either teaching or research in materials science and solid state physics.
Selected Publications	<p>M. A. Pick and D. O. Welch, "Hydrogen Absorption in the Niobium-Vanadium System", <u>Zeits. fur Phys. Chimie N.F.</u> <u>114</u>, 37-43 (1979).</p> <p>T. Luhman, M. Suenaga, D. O. Welch, and K. Kaiho, "Degradation Mechanism of Nb₃Sn Composite Wires Under Tensile Strain at 4.2 K", <u>IEEE Trans. on Magnetics</u> <u>MAG-15</u>, 699-702 (1979).</p> <p>J. F. Bussiere, D. O. Welch, and M. Suenaga, "Young's Modulus of Polycrystalline Nb₃Sn between 4.2 and 300 K", <u>J. Appl. Phys.</u> <u>51</u>, 1024-30 (1980).</p>

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PROCESS SCIENCES DIVISION

M. STEINBERG

ANTHONY S. ALBANESE Chemical Engineering Associate I

Education Polytechnic Institute of Brooklyn (B.S. in Chemical Engineering, 1963); City College of New York (Master of Chemical Engineering, 1968); Cooper Union (Master of Mechanical Engineering with Specialization in Environmental Engineering, 1973); Polytechnic Institute of New York (Advanced Courses in Chemical Engineering).

Research Interests Process R&D; Environmental Science and Engineering; Energy Conversion, Economic Analysis.

Professional Affiliations New York State Professional Engineer, Member of AIChE.

Summary of Experience Recent experience includes conceptual design, technical and economic analyses and modeling of processes, particularly with regard to pollution abatement and energy generation, conversion and conservation. While working for Engineering Companies, he has worked on projects for major chemical companies and Utilities, such as Dupont, Allied Chemical, Merck, Squibb, FMC, Calgon, Stauffer, Revere, PACCO and Distrigas. Specifically, he has worked on the design and/or evaluation of the following: CO generating facility, LNG Storage terminal, activated carbon plant, petrochemical complex, alumina plant, fluidized-bed soda ash plant, inorganic pigments complex, carbon tetrachloride/sulfur chlorides plant, Nylon-6 plant, batch polymerization plant, a process for converting waste ferrous chloride to calcable ferric chloride (flocculant), several food and confections plants, process dust collection and pollution abatement systems, nickel refining processes and a flash roasting process for converting molybdenum pyrites to refined molybdenum.

Selected Publications A. S. Albanese and M. Steinberg, "Environmental Control Technology for Atmospheric Carbon Dioxide," Final Report, BNL 51116, September 1979.

A. S. Albanese and M. Steinberg, "Environmental Control Technology for the Flash Hydropyrolysis of Coal, Progress Report No. 3, April 1-December 31, 1978," BNL 50983, March 1979.

M-S. Shen and A. S. Albanese, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Progress Report No. 13, April 1-September 30, 1979," BNL 51106, January 1980.

BHARAT L. BHATT	Research Associate
Education	Indian Institute of Technology, Bombay (B. Tech. in Chemical Engineering, 1975); Polytechnic Institute of New York (M.S. in Chemical Engineering, 1976, Ph.D. in Chemical Engineering, 1980).
Research Interests	Energy-Coal Gasification and Liquefaction-Process Chemistry, Kinetics, Data Analysis, Correlation, Reaction Modelling, Economic Analysis; Energy Policy Analysis.
Professional Affiliations	American Institute of Chemical Engineers.
Summary of Experience	Responsible for data analysis, correlation and reaction modelling for the flash hydropyrolysis of coal. Perform experiments for kinetic, process chemistry and parametric study of coal devolatilization and hydro-pyrolysis. Evaluate economics of flash hydropyrolysis process plant; developed a mixing model for continuous stirred tank reactors; process and plant design for paperboard manufacture.
Selected Publications	<p>B. L. Bhatt, "Kinetics of Coal Devolatilization and Hydropyrolysis," Ph.D. Thesis, Polytechnic Institute of New York (1980).</p> <p>B. L. Bhatt, P. T. Fallon and M. Steinberg, "Economic Analysis of Flash Hydropyrolysis Process Plant," BNL 22912, June 1977.</p> <p>B. L. Bhatt and E. N. Ziegler, "Effect of Partial Segregation on Conversion in Continuous Stirred-Tank Reactor," <u>AICHE J.</u> <u>23</u>, No. 3, 217-24 (1977).</p>

NEAL CARCIELLO	Chemistry Associate II
Education	State University of New York at Farmingdale, (A.A.S. 1961).
Research Interests	Field of polymer chemistry with the objective to find a high temperature polymer system that could be used to cement geothermal wells.
Summary of Experience	<p>Research with organics for reactor coolants, radiation chemistry of substituted toluenes, thin film investigation for the artificial kidney machine, exploration of mono-layers on water for mosquito control, and lung surface-active agent studies.</p> <p>Attended short course on "The Concepts of Development in Thermal Analysis, Infrared Spectroscopy, and the Hazardous Chemical Safety School. Completed intensive study courses at the Gas Chromatography Institute at Canisius College and the Characterization of Polymers at Virginia Polytechnic Institute.</p>
Selected Publications	<p>A. Zeldin, L. E. Kukacka and N. Carciello, "Influence of the Ratio of Styrene and Acrylonitrile in Cross-linked Polymeric Binders for use in High-Temperature Polymer Concrete Composites," <u>J. Appl. Poly. Sci.</u> <u>24</u>, 1759-65 (1979).</p> <p>N. Carciello, A. Zeldin and L. E. Kukacka, "An Alternate Method of Preparing Polymer Concrete From Mixtures of Liquid and Solid Monomers," <u>J. Appl. Poly. Sci.</u> <u>24</u>, 2191-3 (1979).</p> <p>A. N. Zeldin, J. J. Fontana, L. E. Kukacka and N. Carciello, "High Temperature Polymer Concreted from Organosiloxane resins-" <u>International J. Cement Compos.</u> <u>1</u>, 11-17 (May 1979).</p>

VI DUONG DANG	Associate Chemical Engineer
Education	National Taiwan University (B.S. in Chemical Engineering, 1966); Clarkson College of Technology (M.S. in Chemical Engineering, 1968, Ph.D. in Chemical Engineering, 1971); Associate Research Scientist, New York University Medical Center, 1971-1972; Research Associate, The Johns Hopkins University, 1972-1973; New York State Professional Engineer (License No. 055807), 1978.
Research Interest	Fossil Fuel Conversion; Application of Nuclear Energy to Chemical Processing; Thermohydraulics and Mass Transport.
Professional Affiliations	American Institute of Chemical Engineers; American Chemical Society; American Nuclear Society; American Association for the Advancement of Science.
Summary of Experience	Responsible for several important projects for the Department of Energy on application of nuclear energy to synthetic fuel production by means of high temperature water electrolysis, high temperature coal-steam gasification, water splitting through thermochemical cycle, thermochemical-electrochemical hybrid cycle. Analysis of reaction engineering of coal conversion. Mathematical modeling of transport process and kinetics of various coal conversion reaction. Process analysis of lithium extraction from brine and sea water. Extensive experience on heat and mass of fundamental and practical important problems with application to polymer processing and heat transfer in nuclear reactor. Previously he had industrial experience with electrochemical, chlorine-alkaline and sugar cane company.
Selected Publications	<p>V. D. Dang, "Low Peclet Number Heat Transfer for Power Law Non-Newtonian Fluid with Heat Generation." <u>J. Appl. Polymer Sci.</u> <u>28</u>, 3077 (1979).</p> <p>V. D. Dang and M. Steinberg, "Coal Conversion in Flash Hydrolysis Reactors," Paper No. 13b, <u>87th American Institute of Chemical Engineer Meeting, Boston, Mass.</u> August 1979.</p> <p>V. D. Dang, "Application of the Fusion Reactor for Hydrogen Production From Water " <u>1978 Physicochemical Hydrodynamics Conference, U.S. National Academy of Science, Washington, D.C.</u>, November 1978.</p>

PETER T. FALLON	Development Engineer II
Education	Farmingdale Agricultural and Technical Institute (A.A.S., 1954); Syracuse University (B.S. in Chemical Engineering, 1960).
Research Interests	Process Development; Coal Utilization; Experimental Facilities.
Summary of Experience	Group leader and project engineer for the Flash Hydropyrolysis of Coal Program, responsible for experimental program, presentation of results and supervision of operating personnel. Visiting professor, UNICAMP, Campinas, Brazil. Previously group leader, Engineering Group, High Intensity Radiation Development Laboratory. Performed research in isotopic radiation source calorimetry, radiation dosimetry and chemical reactor design. Supportive in the U.S. AEC's Isotopic Irradiation Foreign Loan Program. Acted as "expert" to governments of India and Pakistan. Consulted with governments of Iran, Korea and Taiwan on design of large irradiation facilities. Temporarily assigned to AEC, Washington, D.C.
Selected Publications	<p>M. Steinberg and P. Fallon, "The Flash Hydropyrolysis (FHP) of Coal," <u>13th Middle Atlantic Regional Meeting of the American Chemical Society, West Long Branch, New Jersey, March 20-23, 1979.</u></p> <p>P. Fallon, B. Bhatt and M. Steinberg, "Flash Hydro-pyrolysis of Lignite and Sub-Bituminous Coals to Both Liquid and Gaseous Hydrocarbon Products," BNL 26210, May 1979.</p> <p>M. Steinberg and P. Fallon, "Coal Processing Technology: Flash Hydropyrolysis of Coal," <u>Chem. Eng. Progress</u> <u>75</u>, No. 6, 63-6 (June 1979).</p>

JACK J. FONTANA	Chemistry Associate I
EDUCATION	Adelphi University (B.S. in Physics, 1963).
RESEARCH INTERESTS	Development of New Materials and/or Processes that can be used in Geothermal or Highway Applications.
Professional Affiliations	American Concrete Institute
Committees	Member, Polymers in Concrete, Committee 548 of ACI, Member, Review Panel of NCHRP 18-2 Transportation Research Board.
Summary of Experience	Over the past 18 years he has conducted research on polymerization reactions of various vinyl type monomers. He has helped develop polymer concrete materials both for highway and geothermal applications. Mr. Fontana served as the BNL consultant to NYS DOT during the Greenport Bridge Reconstruction Project using concrete polymer materials. This was the first structure of its type to be completely rehabilitated using monomer impregnation techniques he helped develop under contract to the Federal Highway Administration.
Selected Publications	<p>J. J. Fontana and L. E. Kukacka, "Greenport Bridge Reconstruction Using Concrete Polymer Materials," BNL 26353, January 1979.</p> <p>J. J. Fontana and A. Zeldin, "Concrete Polymer Materials as Alternate Materials of Construction for Geothermal Applications - Field Test Evaluations," BNL 25957, February 1979.</p> <p>A. N. Zeldin, J. J. Fontana, L. E. Kukacka and N. R. Carciello, "High Temperature Polymer Concretes From Organosiloxane Resins, Cement Composites," <u>The Construction Press Limited 1</u> No. 1 (May 1975).</p>

MARGARET W. GREENE Chemistry Associate I

Education Elmira College (B.A., 1941); Syracuse University (Graduate Study in Biochemistry, 1944); New York University (M.S. in Chemistry, 1946); Columbia University (Graduate Courses in Chemistry, Two Summers).

Summary of Experience Developmental and analytical chemistry, radio-chemistry.

Selected Publications G. I. Senum, R. P. Gergley, M. Greene, R. N. Dietz, "Vapor Tagging of Blasting Caps with Perfluorinated Compounds," The New Concepts Symposium and Workshop On Detection and Identification of Explosives, Reston, Virginia, Oct. 30-Nov. 1, 1978.

 M. W. Greene and E. Lebowitz, "Production of High Purity Radiothallium," Patent No. 3,993,538, Nov. 23, 1976.

 H. L. Atkins, T. F. Budinger, E. Lebowitz, S. N. Ansari, M. W. Greene and R. Fairchild, "Biological Behavior And Physical Properties of Thallium-201," J. of Nuclear Medicine Feb. 1976.

WILLIAM H. HORN

Chemistry Associate III

Education

State University at Farmingdale (A.A.S. in Chem. Technology); C. W. Post College (B.S. in Basic Engineering).

Summary of
Experience

Responsible for experimental work in the field of polymer concrete research. Includes preparation of sample material, construction and use of test equipment for thermal and physical measurements, and collection and correlation of data.

Selected
Publications

T. Sugama, L. Kukacka and W. Horn, "Interaction Mechanisms between Poly (Methyl Methacrylate) and Tricalcium Silicate (C_3S)," J. Appl. Polymer Sci. 24, 2121-35 (1979).

T. Sugama, L. Kukacka and W. Horn, "Hydrothermal Stability of Vinyl-Type Polymer Concret Containing Tricalcium Silicate," Cement and Concrete Res. 9, No. 4, 461-71 (1979).

A. Auskern and W. Horn, "Fracture Energy and Strength of Polymer Impregnated Cement," Cement and Concrete Res. 4, 785-95 (1974).

RICHARD JOHNSON	Chemical Engineering Associate III
Education	Columbia University (B.S. in Chemical Engineering, 1946).
Research Interests	Polymer Technology; Radioactive Waste Storage; Nuclear Fuel Reprocessing.
Summary of Experience	Responsible for experimental program on ethylene-sulfur dioxide and ethylene-carbon monoxide copolymers as energy-conserving substitutes for polyethylene. Investigated storage of tritium in metals as a tritide and also in polymer-impregnated tritiated concrete. Assisted in the development of radioactive waste storage in phosphate glass and in the development of non-aqueous methods for reprocessing spent reactor fuels.
Selected Publications	<p>M. Steinberg, R. Johnson, W. Cordess, and D. Goodman, "Polyketones and Polysulfones for Conservation in the Ethylene Polymer Industry Progress Report No. 3, October-December 1978," BNL 50984, December 1978.</p> <p>M. Steinberg, R. Johnson, W. Cordes and D. Goodman, "Polyketones and Polysulfones for Conservation in the Ethylene Polymer Industry Progress Report No. 4, January-March 1979," BNL 51043, March 1979.</p> <p>M. Steinberg, R. Johnson, W. Cordes and D. Goodman, "Polyketones and Polysulfones for Conservation in the Ethylene Polymer Industry Progress Report No. 5, April-June 1979," BNL 51080, August 1979.</p>

FRANK B. KAINZ	Chemistry Associate
Education	State University of New York at Stony Brook (B.S. in Chemistry, 1976).
Research Interests	Kinetics of Gas-Solid Interfaces; Chemistry of Fluidized Bed Combustion of Coal and Flue Gas Removal Processes.
Professional Affiliations	The American Chemical Society - Northeast Regional Section; New York Sub-section.
Summary of Experience	Have been directly involved in verification of results regarding novel gas calibration devices. Principal investigator of high pressure kinetics of (limestone, calcium silicate) - sulfur dioxide reactions. Characterized fluid-bed sorbents developed at Brookhaven.
Selected Publications	<p>M. Shen, A. S. Albanese, G. Farber, F. B. Kainz and J. Pruzansky, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Progress Report No. 13, April 1-September 30, 1979," BNL 51106, October 1979.</p> <p>M. Shen, A. S. Albanese, J. Pruzansky, G. Farber and F. B. Kainz, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Quarterly Progress Report No. 12, January 1-March 31, 1979," BNL 51040, June 1979.</p> <p>M. Shen, A. S. Albanese, G. Farber, J. Chen, F. B. Kainz and J. Pruzansky, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Quarterly Progress Report No. 11, October 1-December 31, 1978," BNL 50992, March 1979.</p>

LAWRENCE E. KUKACKA	Chemical Engineer
Education	Clarkson College of Technology (B.Ch.E).
Research Interests	Chemical Engineering Research and Development including Organic and Radiation Chemical Processes, and Composite Materials Development.
Professional Affiliations	American Concrete Institute.
Committees	American Concrete Institute, Committee 548, Polymers in Concrete; American Petroleum Institute, Task Group on Geothermal Cements; American Society for Testing and Materials, Committee E45, Geothermal Resources and Energy.
Summary of Experience	<p>Responsible for Brookhaven National Laboratory portion of Department of Energy program for geothermal materials development. The effort includes research and development and technical management of programs to develop plastics, composites, metallic materials and well completion materials. Studies of interactions between organic binders and inorganic filler materials.</p> <p>Development of concrete polymer materials for energy production and transportation applications.</p> <p>Member of USA-USSR Joint Program Group on "Utilization of Polymer Concrete in Wear and Cavitation Resistant Linings on Hydrotechnical Structures and for the Repair of Concrete Structures."</p> <p>Research and development on high pressure radiation chemical processes.</p> <p>Mass transfer and corrosion in high temperature liquid metal and fused salt systems.</p>
Selected Publications	<p>L. E. Kukacka, "Polymer Concrete Materials for use In Geothermal Energy Processes," <u>Proceedings, Second International Congress on Polymers in Concrete, University of Texas at Austin, May 22-25, 1978.</u></p> <p>L. E. Kukacka, T. Sugama and W. Horn, "Interaction Mechanisms Between Polymethylmethacrylate and Tricalcium Silicate," <u>J. Appl. Polymer Sci</u> <u>24</u>, 2121-35, (1979).</p>

Selected
Publications

L. E. Kukacka, A. N. Zeldin and N. Carciello, "Polymer Systems in Geothermal Applications," J. Appl. Polymer Sci. 23, 3179-91 (1979).

JACOB PRUZANSKY	Chemistry Associate II
Education	Long Island University (B.S., 1956).
Research Interests	Qualitative and Quantitative Chemical Analysis.
Summary of Experience	<p>Over 25 years diversified research in planning, conducting and evaluating experimental results, and proposing viable solutions. Specific experience in nuclear and radiation chemistry of liquid and gases. Gas absorption studies, and environmental pollution (water and wastewater treatment and analysis).</p> <p>He is presently involved in the study of regenerable, high capacity sulfur sorbents for desulfurization in fluidized bed combustion.</p>
Selected Publications	<p>M. Shen, A. S. Albanese, G. Farber, J. Chen, F. B. Kainz and J. Pruzansky, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Quarterly Progress Report No. 11, October 1-December 31, 1978," BNL 50992, March 1979.</p> <p>M. Shen, A. S. Albanese, J. Pruzansky, G. Farber and F. B. Kainz, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Quarterly Progress Report No. 12, January 1-March 31, 1979," BNL 51040, June 1979.</p> <p>M. Shen, A. S. Albanese, J. Pruzansky, G. Farber and F. B. Kainz, "Regenerative Process for Desulfurization of High Temperature Combustion and Fuel Gases, Progress Report No. 13, April 1, 1979-September 30, 1979," BNL 51106, October 1979.</p>

WALTER REAMS	Chemistry Associate II
Education	State University of New York at Farmingdale (A.A.S. in Industrial Chemistry, 1954).
Research Interests	Field of Polymer Chemistry for Geothermal and Highway Applications.
Summary of Experience	Attended courses on the concepts and development in thermal analysis, polymer concrete and highway applications. Infrared Spectroscopy at Canisius College. Research in radiation chemistry in solid state reactions. Reaction of solids with NO ₂ studies of surface chemistry with the hydrophil balance.
Selected Publications	<p>W. Reams, G. Adler, and N. Carciello, "The Reaction of "Stacked Bilayer" Structured Solids with NO₂," BNL 19538, December 1974.</p> <p>A. N. Zeldin, L. E. Kukacka, J. J. Fontana, N. R. Carciello and W. Reams, "Influence of Curing Agent Concentration and Curing Temperatures on the Thermo-stability of Styrene-Acrylonitrile-Acrylamide-Trimethylolpropane Trimethacrylate Copolymer Systems," <u>J. Appl. Polymer Sci.</u> 24, No. 2, 455-64 (1979).</p>

MICHAEL J. SANSONE	Associate Chemist
Education	Rensselaer Polytechnic Institute (B.Ch.E. 1965, Ph.D Physical Chemistry 1970).
Research Interests	Coal Conversion; Synthesis Gas Conversion; Heterogeneous Catalysis; Process Development.
Professional Affiliations	American Chemical Society.
Summary of Experience	Dr. Sansone had five years of industrial experience prior to coming to Brookhaven Laboratory. He has worked in process development for hydrogen peroxide manufacture and in barium and strontium chemicals. He has extensive experience in the study of the thermodynamics and kinetics of heterogeneous reactions, both catalyzed and uncatalyzed. At Brookhaven, he is associated with the catalysis group studying the conversion of synthesis gas to various products such as diesel and jet fuels. He is also working in the area of new conversion schemes for coal with emphasis on coal gasification.
Selected Publications	<p>R. S. Sapienza, M. J. Sansone, L. D. Spaulding, J. F. Lynch, "Novel Interpretations of Carbon Oxide Reductions," <u>First International Conference on Homogeneous Catalysis, Corpus Christie, Texas, Nov. 29-Dec. 1, 1978.</u></p> <p>M. J. Sansone, A. Albanese, and M. Steinberg, "Alternative Process Schemes for Coal Conversion, Progress Report No. 1, 1, October 1978-January 31, 1979," BNL 51011, February 1979.</p> <p>M. J. Sansone, A. Albanese, and M. Steinberg, "Alternative Process Schemes for Coal Conversion, Progress Report No. 2, February 1-April 30, 1979," BNL 51075, May 1979.</p>

TOSHIFUMI SUGAMA	Assistant Chemist
Education	Tokyo Denki University (MSc. in Faculty of Engineering, 1972, Ph.D. in Faculty of Engineering, 1975).
Research Interests	Synthesis of $\text{CaO} - \text{SiO}_2$ Hydrates on Organic Polymer Surfaces. Analysis of Ionic Bonding Energy between Organic Polymers and Inorganic Ceramics and their Interaction Mechanisms.
Summary of Experience	Design and production planning of polymer concrete piling and hollow core slabbing. Quality control methods of water-proof materials using polymers in building construction. Discovery of quality analysis method for magnesium content of asbestos. Development of $\text{CaO} - \text{SiO}_2$ system filler for improvement of high temperature properties of organic polymers.
Selected Publications	<p>T. Sugama, L. E. Kukacka and W. Horn, "Hydrothermal Stability of Vinyl-Type Polymer Concrete Containing Tricalcium Silicate (C_3S)," <u>Cement and Concrete Res.</u> <u>9</u>, No. 4, 461-71 (1979).</p> <p>T. Sugama, L. E. Kukacka and W. Horn, "The Effect of Tricalcium Silicate (C_3S) on the Thermal Stability of Condensation-Type Polymer Concretes," <u>Inter. J. Cement Composites</u> <u>1</u>, No. 2, 55-62 (1979).</p> <p>T. Sugama, L. E. Kukacka and W. Horn, "Interaction Mechanisms between Poly (Methyl Methacrylate) and Tricalcium Silicates (C_3S)," <u>J. Appl. Polymer Sci.</u> <u>24</u>, 2121-35 (1979).</p>

RONALD P. WEBSTER	Chemical Engineering Associate III
Education	The University of Texas at Austin (B.S. in Architectural Engineering, 1975, M.S. in Engineering, 1976).
Research Interests	The selection and use of concrete-polymer materials for highway and structural applications. Present research centers on the selection of polymer and aggregate systems for use in thin overlays for highway applications, and the improvement of natural aggregates by materials impregnation.
Professional Affiliations	The American Concrete Institute
Summary of Experience	Mr. R. Webster has worked in the field of concrete-polymer materials since 1975. He has worked at Brookhaven National Laboratory since October, 1976, during which time he has been mainly involved in the development of a thin polymer-concrete overlay for highway applications. As a result of this work, an Interim Users' Manual has been prepared for the Federal Highway Administration, U.S. Department of Transportation. Prior to October, 1976, he worked for two years as a research assistant at the Center for Highway Research at the University of Texas at Austin.
Selected Publications	<p>R. Webster, J. Fontana, L. E. Kukacka, "Thin Polymer Concrete Overlays Interim Users' Manual," BNL 24215, March 1978.</p> <p>R. Webster, J. J. Fontana, and L. E. Kukacka, "Rapid Patching of Concrete Using Polymer Concrete," BNL 25236, February 1978.</p> <p>R. Webster and J. J. Fontana, "Improvement of Wear-Resistance Properties of Natural Aggregates By Materials Impregnation," BNL 25396, September 1978.</p>

ARKADY N. ZELDIN	Associate Chemical Engineer
Education	Mendeleev Chemical Technological Institute of Moscow, (Diploma in Technology of Plastics, 1962); Moscow Polytechnical Institute (Ph.D. in Chemical Engineering, 1970).
Research Interests	Study of High Temperature Polymer and Copolymer Systems for use in Different Geothermal Applications.
Professional Affiliations	The American Concrete Institute
Summary of Experience	Supervised research in phosphate fertilizers for agricultural improvement; developed technology of fertilizers; responsible for scientific assistance for plant fertilizers; supervised actuation of a polyethylene plant imported from West Germany; responsible for the research of polymerization and copolymerization ethylene with other monomers under high pressure; Responsible for development of polymer-concrete well cementing compositions.
Selected Publications	<p>A. N. Zeldin, L. E. Kukacka and N. R. Carciello, "Polymer Systems in Geothermal Applications," <u>J. Appl. Polymer Sci.</u> <u>23</u>, 3179-3191 (1979).</p> <p>A. N. Zeldin, L. E. Kukacka, J. J. Fontana, N. R. Carciello and W. Reams, "Influence of Curing Agent Concentration and Curing Temperatures on the Thermostability of Styrene-Acrylonitrile-Acrylamide-Trimethylolpropane Trimethacrylate Copolymer Systems," <u>J. Appl. Polymer Sci.</u> <u>24</u>, No. 2, 455-464 (1979).</p> <p>A. N. Zeldin, L. E. Kukacka and N. R. Carciello, "Influence of the Ratio of Styrene and Acrylonitrile in Crosslinked Polymeric Binders for use in High Temperature Polymer Concrete Composites," <u>J. Appl. Polymer Sci.</u> <u>24</u>, No. 7, 1759-65 (October 1979).</p>