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A COMPREHENSIVE BIBLIOGRAPHY
OF LITERATURE PUBLISHED BEFORE 1969
PERTAINING TO
ELECTRICAL CONDUCTION IN
 Al_2O_3 , BeO , HfO_2 , MgO , SiO_2 AND ThO_2

October 1969

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ELECTRICAL CONDUCTION IN
 Al_2O_3 , BeO , HfO_2 , MgO , SiO_2 and ThO_2

by

S. C. Keeton, R. R. Schemmel
Applied Physics Department
Systems and Electronics Division

J. L. Bates

Physical Ceramics Department
Chemistry and Metallurgy Division

October, 1969

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INTRODUCTION

This literature survey was performed for the Division of Reactor Development and Technology of the Atomic Energy Commission under the program entitled, "Development of Methods for Improving High Temperature, High Radiation Performance of Reactor Cable Insulation." The program was designed to fulfill the requirements of LMFBF Task 4-6.2 entitled, "Electrical Insulators for Sensors and Cables." The purpose of the program is to determine the electrical conduction mechanisms and related properties of electrical insulators at high temperatures and to determine the effects of radiation on these properties so that cable insulation for in-reactor use can be improved. A comprehensive search, compilation and analysis of available data from publications is to be supplemented by experiments and to be issued in handbook form and periodically updated as more information becomes available.

This bibliography contains all articles found which pertain to the electrical conduction properties of alumina, beryllia, hafnia, magnesia, silica and thoria. These materials were chosen because they represent the most attractive candidates for high temperature electrical insulation.

The literature survey was conducted in essentially two steps. The first entailed an exhaustive search for all publications relating to the electrical properties of the aforementioned insulators in the following sources:

1. January 1960 through June 1968 of the Bibliography of High Temperature Chemistry and Physics of Materials in the Condensed State (a quarterly publication).
2. 1907 through 1968 of Chemical Abstracts.
3. 1948 through 1968 of Nuclear Science Abstracts.

Key words used in the last two sources, in addition to the insulator itself, e.g. alumina, aluminum oxide, etc., were electrical conductivity, resistivity and resistance, as well as, dielectric properties, constant, loss and breakdown. The articles which were found in this way were obtained and filed in our "Insulator Library."

The second step in our literature search involved obtaining pertinent articles which were referenced in the articles obtained in the first step. These articles then yielded articles through their reference list and the process was repeated until no more appropriate articles could be found in this manner.

The bibliography in this report applies only to those articles dealing with electrical conduction phenomena in the above insulators. Most deal with measurements of the electrical conductivity or resistivity of the "pure" materials; however, articles dealing with solid solutions of one or more of the above metal oxide insulators and articles dealing with the conduction mechanisms have been included for completeness.

All references in the bibliography are listed with the following format:

1. Name of Author or Authors.
2. Title of Article.
3. Journal, book or document in which it can be found.
4. The Chemical Abstract (CA) or Nuclear Science Abstract (NSA) number.

The number corresponding to 4 is not always included. The names of some Journals have been abbreviated in the way prescribed in the Appendix. When an article contains an anonymous author or when it is difficult to determine the authors, e.g., some government progress reports, the letter Q is used.

This bibliography will be periodically updated when an adequate number of additional articles have been found. Also, a bibliography containing articles on the dielectric properties and one on other pertinent properties of the same metal oxide insulators will be issued soon.

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APPENDIXPeriodical Abbreviations

- Trans. Am. Nucl. Soc.
Transactions of the American Nuclear Society
- Am. Cer. Soc. Bull.
American Ceramic Society Bulletin
- J. Am. Cer. Soc.
Journal of the American Ceramic Society
- Appl. Phys. Let.
Applied Physics Letters
- Proc. Brit. Cer. Soc.
Proceedings of the British Ceramic Society
- Trans. Brit. Cer. Soc.
Transactions of the British Ceramic Society
- Brit. J. Appl. Phys.
British Journal of Applied Physics
- Dokl. Akad. Nauk SSSR
Doklady Akademii Nauk SSSR
- J. Elektrochem. Soc.
Journal of the Electrochemical Society
- Fiz. Tverd. Tela
Fizika Tverdogo Tela
- Sov. Phys.-Solid State
Soviet Physics-Solid State
- Izv. V.U.Z., Fiz.
Izvestiya Vysshikh Uchebnykh
Zavedenii, Fizika
- Izv. Akad. Nauk SSSR, Neorgan. Materialy
Izvestiya Akademii Nauk SSSR, Neorganicheskie Materialy
- J. Appl. Phys.
Journal of Applied Physics
- J. Chem. Phys.
Journal of Chemical Physics

- J. Nucl. Mater.
Journal of Nuclear Materials
- J. Phys. Chem.
Journal of Physical Chemistry
- J. Phys. Chem. Solids
Journal of Physics and Chemistry of Solids
- J. Res. Natl. Bur. Stds.
Journal of Research of the National Bureau of Standards
- Phil. Mag.
Philosophical Magazine
- Phys. Rev.
Physical Review
- Proc. Phys. Soc. (London)
Proceedings of the Physical Society (London)
- J. Phys. Soc. Japan
Journal of the Physical Society of Japan
- Rev. Sci. Instr.
Revue of Scientific Instruments
- Proc. Roy. Soc. (London)
Proceedings of the Royal Society (London)
- Tr. Inst. Elektrokhim., Akad. Nauk SSSR, Ural. Filial
Trudy Instituta Elektrokhimii, Akademiya Nauk SSSR, Uralskii Filial
- Z. Elektrochem.
Zeitschrift fur Elektrochemie
- Zhur. Fiz. Khim.
Zhurnal Fizicheskoi Khimii
- Russ J. Phys. Chem.
Russian Journal of Physical Chemistry
- Zhur. Tekhn. Fiz.
Zhurnal Tekhnicheskoi Fiziki
- Sov. Phys.-Tech. Phys.
Soviet Physics-Technical Physics

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