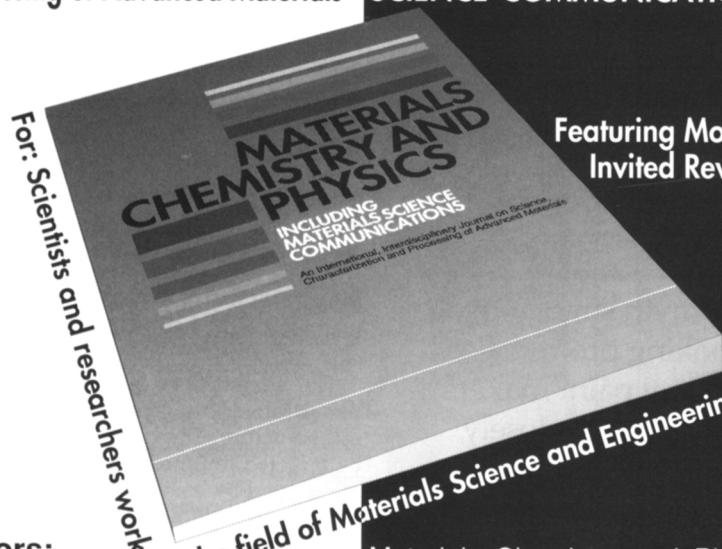


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Non-Electronic Applications of Silicon Nitride. SiN_x, SiN_x:H; Supplement Volume B5e; Gmelin Handbook of Inorganic and Organometallic Chemistry

Edited by W. Kurtz and F. Schröder

(Springer-Verlag, 1994)

ISBN: 3-540-93693-9

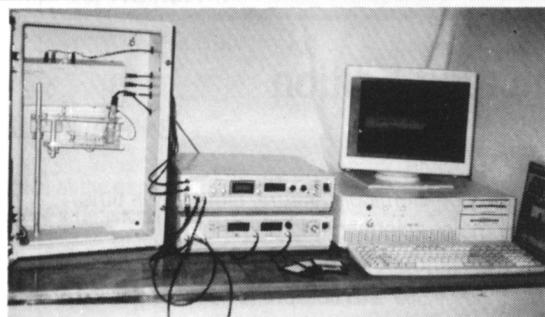
If you have ever wondered what one can do with silicon nitride or what has been already studied for this material, this is the book for you. The volume presents the results of a comprehensive literature survey on silicon nitride, nonstoichiometric silicon-nitrogen alloys, and nonstoichiometric silicon-nitrogen-hydrogen alloys. The thoroughness of the review is indicated by the listing of 3,950 references for the first section.

The references for Part 1, "Non-Electronic Applications of Silicon Nitride," are dominated by patent citations, mainly Japanese, that describe the processing of silicon-nitride ceramics for actual or potential applications. There are 154 listings of general reviews alone. Most of Part 1 is categorized in terms of applications: refractory uses, engines, tribological applications, abrasives and polishing materials, electrical, biotechnology, nuclear power, and other industrial technologies. Joining and coatings receive comprehensive treatments with 650 and 408 references, respectively. Most of this part is written in descriptive terms of preparation processes and general properties for the specific application. The amount of information presented is somewhat overwhelming but any section provides an excellent starting point for further literature study.

Part 2, "Non-Stoichiometric Silicon-Nitrogen Alloys," is organized by preparation techniques, structures, and properties. The information is well-organized to indicate the range of structures or properties that can be expected for specific preparation techniques. The data are specific and a quick reference to this section is likely to provide enough information that extensive follow-up library use will not be required for most readers. The properties described include microstructure, coordination and electronic structure, mechanical properties, thermal properties, electrical properties, and optical properties.

Part 3, "Non-Stoichiometric Silicon-Nitrogen-Hydrogen Alloys," contains a more extensive section on preparation than does Part 2, but otherwise is similarly organized. The range of structures and properties that have been obtained is clearly stated in a format that will satisfy most reference needs.

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In summary, this will be a most useful, indeed necessary, reference for materials scientists interested in any of the many silicon-nitrogen alloys. This volume can save an investigator hours or days of library study. It is well-organized and complete.

Reviewer: Carl J. McHargue is a professor of materials science and engineering and director of the Center for Materials Processing at the University of Tennessee-Knoxville. His recent research interests have focused on surface modification of ceramics.

Corrosion of Ceramics

Ronald A. McCauley
(Marcel Dekker, Inc., 1994).
ISBN: 0-8247-9448-6

Corrosion of Ceramics is "intended predominantly as a reference work for practicing engineers" but can be used as a reference text at the advanced undergraduate and graduate levels. The earlier portions of

the work deal with fundamentals of attack by liquid and molten metals, vacuum, gases, and electrochemical effects. The roles of porosity, surface energy, and acid/base are treated in adequate detail. Brief but fundamental treatments of the relevant thermodynamics, kinetics, and diffusion as related to structure are clearly presented. In general, the book has a wealth of references, presented in such a fashion as to be convenient for specific material systems. Test procedures and ASTM standards are organized in a very useful manner, clearly identifying areas of application.

The corrosion of glasses is treated in terms of specific classes of systems ranging from silicate glasses to fluoride and mixed halide glasses. Oxides, nitrides, borides and glasses are discussed with respect to mechanisms of degradation. These systems, including zirconia-containing materials, are presented in terms of attack by

atmospheric environments, molten metals, salts, and aqueous solutions.

Later sections of the volume deal with a large number of specific systems and the corrosion problems involved in attack by liquids, gases and solids. A final section deals with methods that can be used to improve the service performance of various types of refractories. The book is a refreshing combination of applied and relevant fundamental concepts. The utility as a textbook would be increased by presentation of problems to be worked, but there is an extensive and useful reference literature listing.

Reviewer: B.F. Oliver is a professor in the Department of Materials Science and Engineering at the University of Tennessee-Knoxville. His research activities include the preparation of very high-purity metals and alloys and the study of the mechanical properties of such materials. □