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Book Reviews

Introduction to Fine Ceramics, edited by N. Ichinose.

REVIEWED BY RANGA KOMANDURI [1]

Introduction to Fine Ceramics: Applications in Engineering, edited by N. Ichinose is written, according to the editor, with the aim of providing an illustrative, easy-to-understand book on this subject. This all japanese authored book on fine ceramics or functional ceramics addresses an important subject in which the japanese have a commanding position both in research and technology development. The Japan's Ministry of International Trade and Industry (MITI) made a commitment in 1981 to promote and develop fine ceramics as part of its next generation industrial technology development program. About the same time, the manufacturers and users of fine ceramics formed the Fine Ceramic Society to promote research and information exchange in manufacture and utilization, market research, technology development, and international exchange. The japanese strongly believe that fine ceramics technology has great potential and are working diligently to exploit it.

Engineering ceramic materials are becoming increasingly more important to a growing number of industries including electrical, electronic, mechanical, and biomedical. Using a question and an answer format, various authors of this book have addressed several phenomena associated with ceramics and gave examples of practical applications of fine ceramics with the hope of providing engineers and materials scientists a better appreciation of the field.

The 160 page book is divided into the following 5 chapters, a table of contents, and an index.

1. Fundamentals of Ceramics
2. Structural Ceramics
3. Electronic Ceramics
4. Glass and Optical Fibers, and
5. New Technology of ceramics.

Chapter 1 deals with the fundamentals of ceramics. It begins with an explanation of how ceramics differ from metals and organic materials. This is followed by a description of fine ceramics. A discussion on crystal and microstructural aspects and grain boundaries of ceramics then follows. Powder synthesis, various forming processes, and sintering processes are then described. Various kinds of functional ceramics, electronic ceramics, and high-temperature, heat resistant ceramics and their fields of application are then outlined.

Chapter 2 is concerned with structural ceramics. First oxide and non-oxide ceramics are classified and characterized. This is followed by a description of ceramic nitrides and carbides. A detailed discussion on the commonly used ceramics such as alumina, zirconia, silicon nitride, silicon carbide, SiAlON, AlN, and boron carbide including their characteristics and applications then follows. Cemented TiC and WC are then described. Finally, zirconia ceramic used in nuclear fuel system is briefly discussed.

Chapter 3 deals with electronic ceramics. First, magnetic materials such as ferrites used for radiowave absorbers and magnetic cores for accelerators, and piezoelectric ceramics used in ignition devices, transformers, and resonators are discussed. This is followed by a treatment of ceramics used as sensors for monitoring temperature, gas, moisture, pressure etc. Finally, electro-optical ceramics, optical ceramics, and translucent alumina used in high intensity lamps are briefly covered.

Chapter 4 is concerned with glass and optical fibers. First various types of glasses including opal glass, silica glass, and VYCOR glass are discussed. This is followed by a description of photochromism, glass dosimeter that measures radiation, radiation proof glasses, glasses used in the treatment of radioactive waste, glasses used for laser applications, glass fibers used in polymer composites, and optical fibers for telecommunications.

Chapter 5 deals with new ceramic technologies and new applications for ceramics. Fine ceramics used for biomedical applications are then described. This is followed by a discussion of high-strength, high-toughness ceramics, rapidly solidified amorphous ceramics, superconducting ceramics (developed prior to the 1986 discovery), high thermal conductivity ceramics, and bioglass. Finally, ultrafine ceramic powers, laminated and multilayer ceramics are covered.

The book provides insights on many interesting aspects of functional ceramics written mainly for engineers with non-ceramics background. It would be a good source for engineering students and practicing engineers. It is recommended for all engineering libraries and as a reference book for engineers.

Fine Ceramics, edited by S. Saito.

REVIEWED BY RANGA KOMANDURI

Fine Ceramics, edited by Shinroku Saito is a welcome addition to the field of ceramics. Different chapters, of this all japanese authored book, were written by some 47 researchers from industry and academia. The editor in the Preface offers this book as greetings from Japan to colleagues in the ceramics industry worldwide, as a step towards future communication and deeper understanding.

Japan's commanding position in both research and technology development in fine ceramics is well recognized. The term, fine ceramics, is used in the context of engineering ceramics which includes both functional ceramics and struc-

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