

Indentation Techniques in Ceramic Materials Characterization; Ceramic Transactions, Vol. 156

A.G. Solomah, Ed.

(The American Ceramic Society, 2004)

162 pages, \$109.00

ISBN 1-57498-212-5

This small volume contains a collection of short articles related to the use of indentation techniques for the characterization of the properties of ceramic materials. The topics covered are diverse and include fracture toughness, residual stresses, fatigue, creep, and phase transformation. Apart from the hardness measurement itself, the evaluation of fracture toughness is one of the most widely used applications for the indentation test. The simplicity of the test and the ease of sample preparation are obvious benefits. As is discussed in the first article in the book, difficulties can arise because the empirical formulae available in the literature can give a wide range of fracture toughness values when applied systematically to a common data set of indentation load versus crack-length measurements. Approaches are discussed in different articles in the book and in the Open Forum and Discussion summary for improving testing methodology and providing standardization in collecting and reporting data for fracture toughness evaluation. The use of Vickers crack-opening displacement measurements for toughness evaluation is one of the more novel and interesting new techniques reported in the book.

The scope of the book precludes covering all of the indentation crack-based fracture toughness evaluation techniques. For example, indentation pre-crack strength testing or direct measurement of crack length versus applied stress can be mentioned. Among the other articles in the book, the ones on residual stress measurements using scribing or nanoindentation are of interest. The latter method is used for thin-film analysis and can be an important complement to x-ray diffraction and bend curvature analysis. An article on indentation creep is also included and verified with test results using conventional creep tests. The indentation creep method is attractive because it can be used with samples that are not amenable to conventional creep-test procedures. Other articles in the volume address high-temperature indentation tests, evaluation of properties for specific material systems including car-

bon microspheres, grinding models, and acoustic or Raman characterizations combined with indentation tests.

In summary, this small volume provides an interesting perspective on the breadth of indentation test applications and highlights the need for caution and systemization in applying the "standard" indentation fracture toughness evaluation test and analysis methodology to ceramic materials.

Reviewer: R.O. Scattergood is a professor of materials science in the Department of Materials Science and Engineering at North Carolina State University. His research interests and expertise are in the area of mechanical properties, including indentation-based testing methods for ceramic materials.

The Chicago Guide to Communicating Science

Scott L. Montgomery

(The University of Chicago Press, Chicago, 2003)

xi + 228 pages, \$15.00

ISBN 0-226-53485-5

"There are no boundaries, no walls, between the doing of science and the communication of it; communicating *is* the doing of science," says Scott L. Montgomery in the opening lines of this eloquently written guide to scientific expression. Readers expecting a dry handbook of grammatical rules and scientific usage (particularly coming from the publishers of the venerable *Chicago Manual of Style*), will be pleasantly surprised instead to find an insightful work that takes seriously the professional implications of scientists' ability to write and speak effectively: In short, their reputation depends on it.

Montgomery has the credentials to support this claim. A consulting geologist, he is widely published in his field and has authored several books on scientific language and the history of science.

His scholarship as a science historian shows in Chapter 2, where he presents an interesting survey of how language styles in the literature have evolved over the centuries since Newton first wrote about "the celebrated phaenomena of colours" produced by a triangular glass prism. Montgomery then puts Watson and Crick's famous 1953 paper on DNA under the microscope to reveal the techniques of scientific rhetoric that make it effective and persuasive. Throughout the

book, Montgomery emphasizes this use of models from the actual literature as a practical technique for learning good writing. Developing an ear for the rhythm and flow of quality writing in one's field is an important step toward developing a personal style that can elevate merely functional scientific authorship to the level of eloquence, even beauty.

The book transitions smoothly from a few overview chapters (the historical review and such topics as "Reading Well," "Writing Well," and "Writing Very Well") to a closer look at surviving the peer-review process; structuring a scientific paper; effectively using graphics; and preparing review articles, book reviews, technical reports, proposals, and oral presentations. Aspects of science communication on the Web are treated, as are the challenges that face researchers for whom English is a foreign language. Montgomery also provides practical advice for dealing professionally with the press and communicating science to the general public.

Montgomery's own writing style is graceful, and his wry use of scientific metaphors is imaginative and amusing ("the editorial profession in science, like certain gases, is both noble and volatile"). His prose becomes only slightly less eloquent in the chapters that are more "how-to"-oriented, but even at his most pedestrian, Montgomery communicates with clarity and conciseness.

In his brief conclusion, Montgomery returns to his initial thesis that communication is the *sine qua non* of science and that a scientist's ability to effectively present his or her work to others can be an experience of "a conscious deepening of one's participation in a domain that, after all, one has chosen for a lifetime of effort and loyalty." He includes a substantial bibliography, with references to the models used in the book as well as other resources for further reading in scientific communication.

Invaluable to a graduate student or postdoctoral candidate first navigating the waters of science publishing, this highly readable book also provides a perspective on scientific discourse that makes it a worthy read for even the most well-published scientist.

Reviewer: Amy Bertram Wilson is technical editor of MRS Bulletin.

The following recently published books, relevant to materials research, have come to *MRS Bulletin's* attention. Some of the books listed here may be reviewed in future issues of *MRS Bulletin*. To review a book from the list or to offer recommendations of additional books, contact K. Wilson, Editorial Assistant, *MRS Bulletin*, 506 Keystone Drive, Warrendale, PA 15086-7573, USA; e-mail bulletin@mrs.org.

Books

Experimental Techniques

Impedance Spectroscopy: Theory, Experiment, and Applications, Evgenij Barsoukov and J. Ross Macdonald, Wiley, 2005, 612 pp., \$125.00, ISBN 0-471-64749-7.

Optical Imaging in Projection Microlithography, Alfred K. Wong, SPIE Press, 2005, 276 pp., \$56.00, ISBN 0819458295.

Principles of Lithography, 2nd Ed., Harry J. Levinson, SPIE Press, 2005, 438 pp., \$84.00, ISBN 0819456608.

Inorganic Chemistry, Electrochemistry, Other Chemistry, and Ceramics

Corrosion Handbook: Corrosive Agents and Their Interaction with Materials, Volume 2: Hydrochloric Acid, Nitric Acid, 2nd Ed., Gerhard Kreysa and Michael Schütze, Wiley, 2005, 621 pp., \$460.00, ISBN 3-527-31118-1.

Dielectric Phenomena in Solids, Kwan Chi Kao, Elsevier, 2004, 579 pp., \$99.95, ISBN 0-12-396561-6.

Polar Oxides: Properties, Characterization, and Imaging, Rainer Waser, Ulrich Böttger, and Stephan Tiedke, Wiley, 2005, 391 pp., \$190.00, ISBN 3-527-40532-1.

Materials Processing

Principles of Plasma Discharges and Materials Processing, Michael A. Lieberman and Allan J. Lichtenberg, Wiley, 2005, 757 pp., \$115.00, ISBN 0-471-72001-1.

Superplasticity: Microstructural Refinement and Superplastic Roll Forming, Oscar A. Kaibyshev and Farid Z. Utyashev, Futurepast Publications, 2005, 386 pp., \$165.00, ISBN 0-9710464-2-5.

Welding Metallurgy and Weldability of Stainless Steels, John C. Lippold and Damian J. Kotecki, Wiley, 2005, 357 pp., \$115.00, ISBN 0-471-47379-0.

Metallurgy

Mechanics of Materials: A Modern Integration of Mechanics and Materials in Structural Design, Christopher Jenkins and Sanjeev Khanna, Elsevier, 2005, 384 pp., \$89.95, ISBN 0-12-383852-5.

Stress, Strain, and Structural Dynamics: An Interactive Handbook of Formulas, Solutions, and MATLAB Toolboxes, Bingen Yang, Elsevier, 2005, 960 pp., \$89.95, ISBN 0-12-787737-3.

Tribology in Chemical-Mechanical Planarization, Hong Liang and David Craven, CRC Press, 2005, 200 pp., \$139.95, ISBN 0824725670.

Physics and Electronics

Batteries for Portable Devices, Gianfranco Pistoia, Elsevier, 2005, 310 pp., \$187.00, ISBN 0-444-51672-7.

Electronic Materials Science, Eugene A. Irene, Wiley, 2005, 320 pp., \$99.95, ISBN 0-471-69597-1.

Ferroelectricity: The Fundamentals Collection, Julio A. Gonzalo, Wiley, 2005, 192 pp., \$152.00, ISBN 3-527-40486-4.

Magnetism: Molecules to Materials V, Joel S. Miller, Wiley, 2005, 395 pp., \$190.00, ISBN 3-527-30665-X.

Smart Materials and Technologies in Architecture, Michelle Addington and Daniel L. Schodek, Elsevier, 2004, 256 pp., \$59.95, ISBN 0-7506-6225-5.

Polymer Chemistry and Biomaterials

Additives in Polymers: Industrial Analysis and Applications, Jan Bart, Wiley, 2005, 836 pp., \$335.00, ISBN 0-470-85062-0.

Structure of Materials

Introduction to Materials Modeling, Zoe Barber, Maney Publishing, 2005, 160 pp., \$31.00, ISBN 1-902653-76-9. □

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