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Plasma Processing for VLSI

Edited by: N. G. Einspruch and D. M. Brown

(Volume 8 of VLSI Electronics Microstructure Science, edited by N. G. Einspruch, 1984, Academic Press)

Plasma Processing for VLSI is an excellent resource for anyone interested in this topic. After a brief summary of the development of the field (D. L. Tolliver), the book is divided into three major sections:

1. Deposition: articles on metal and dielectric sputtering (R. S. Nowicki), PECVD of metals and silicides (D. W. Hess) and of dielectrics (T. B. Gorcyzca and B. Gorowitz).

2. Lithography: articles on trilayer resist (J. B. Kruger, M. M. O'Toole, and P. Rissman), plasma sources for x-ray (D. J. Nagel) and for deep UV (A. N. Petelin and M. G. Ury).

3. Etching (more than half the book): articles on the basic principles (D. L. Flamm, V. M. Donnelly, and D. E. Ibbotson), high-pressure etching (D. L. Smith), RIE (B. Gorowitz and R. J. Saia), ion beam milling (R. E. Lee), RIBE (B. A. Heath and T. M. Mayer), plasma diagnostics (W. R. Harshbarger), emerging dry etch techniques, (Y. Horiike), and the application of dry etch to advanced device structures (T. P. Chow).

Although the organization is interesting, I might suggest that if the reader is not actively involved in plasma processing he might augment the historical introduction with a technical one. Chapter 7 of **Glow Discharge Processes** (B. Chapman, John Wiley 1980), or one of the many fine review articles by J. W. Coburn are well suited for this purpose.

The article on sputtering is a brief but worthwhile review which lends perspective to the chapters on PECVD. The trilevel article is excellent but the contributions about x-ray and deep UV sources, although clearly written, seem misplaced in a book about processing. Perhaps a review of the progress in fully dry developable resists and/or plasma stability of resist materials (with some chemistry) would be a more natural fit in the lithography section.

The main part of Volume 8 deals with dry etching. It starts with a thorough review (Flamm, et al.) and ends with an intriguing chapter about advanced applications (Chow). The organization and quality of the contributions to this section cannot be faulted. Although there is an excellent article on emerging techniques (Horiike), I feel that a few additional topics might deserve extended treatment: electron cyclotron resonance low voltage high current plasma sources, as well as a chapter on radiation damage and polymeric contamination.

In summary, the material in Volume 8 is important and well presented. The omission of certain topics is not a serious drawback; plasma processing is a rapidly advancing technology and the format of the "VLSI Electronics" series would certainly allow for inclusion in subsequent volumes.

Reviewer: Stephen M. Bobbio, Member of the Technical Staff, Microelectronics Center of North Carolina.

Preferred Orientation in Deformed Metals and Rocks: An Introduction to Modern Texture Analysis

Edited by Hans-Rudolph Wenk

(1985, Academic Press)

This volume is an outgrowth of a workshop on Deformation Mechanisms and Texture Development in Rocks, held as part of the 23rd U.S. Symposium on Rock Mechanics, Berkeley, California, in 1982. The participants from a wide variety of fields (materials science, metallurgy, geology, geophysics, and physics) recognized the need for an up-to-date review and introduction to theoretical, experimental, and analytical techniques applied in the study of the texture or fabric of materials. In the opinion of this reviewer, the editor and authors have been most successful in reaching this goal.

The volume contains 27 contributions from authors in seven countries. The book is divided into three parts. Chapters 2 through 7 present techniques and procedures with some discussion of the theory of the analysis of orientation data. Chapters 8 through 12 describe the mechanisms and processes by which polycrystalline materials deform. Chapters 13 through 26 describe the results of specific systems. Taken as a whole, the volume provides an unique, well-referenced introduction to the field of preferred orientation and will be particularly useful to workers in the field who wish to apply their techniques to other important systems. For some topics, particularly in the early chapters, the introduction is a bit too brief. As an example, the discussion of symmetry, three-dimensional point groups, and symmetry elements of the second kind (Chapter 3) requires that the reader already be very familiar with the subject or go immediately to a more expanded presentation in another source.

Chapter 8 by D. J. Barber provides a concise, well-illustrated introduction to dislocations and microstructures. The most interesting aspect of the book is the diversity of examples of specific systems which are presented in the latter chapters. There are discussions of the microstructures in metals (H. Mecking), copper-brass (J. Hirsch and K. Lücke), evaportites (H. Kern and A. Richter), ore minerals (H. Siemes and Ch. Hennig-Michaeli), carbonates (H.-R. Wenk), quartzites (G. P. Price), olivine and pyrox-

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