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book reviews

Works intended for this column should be sent direct to the Book-Review Editor, whose address appears in this issue. All reviews are also available from **Crystallography Journals Online**, supplemented where possible with direct links to the publisher's information.

The atomistic nature of crystal growth. By B. Mutaftschiev. Pp 368. Berlin: Springer-Verlag, 2001. Price DM 179, GBP 61.50, US $106. ISBN 3-540-66496-3.

In 19 chapters and 6 appendices, and in masterly fashion, this book presents the basic information needed for a physical understanding of the atomistic aspects of crystal growth. While avoiding a compilation of existing theories, the book introduces the reader to the fundamentals needed for treating the mechanisms of nucleation and growth. As the subject is discussed on a molecular level, the approach is largely based on statistical thermodynamics. A merit of the book is that it puts in evidence methods and trends that nucleation and growth share with chemical kinetics and surface science.

Of primary interest for those involved in the theory of nucleation and growth, the book will also be useful as a reference text for experimentally oriented crystal growers, as well as for those who apply themselves in computer simulations, where it will help them to run growth simulations avoiding, as is not always the case, non-physical conditions. In addition, as college-level rather than advanced mathematics is employed throughout, and all important results are derived, the book will also be useful for graduate students taking their first steps in solid-state physics and chemistry, and surface science.

As to the content, after a historical review, Part I rehearses the necessary thermodynamic background, limiting the statistical approach to the canonical ensembles. Part II deals with the equilibrium behaviour of surfaces and interfaces, especially in consideration of their subsequent role in conditioning the kinetic processes. Adsorption, as common to all surface phenomena, is given particular attention and many important concepts are introduced and discussed, *e.g.* Kossel crystal, crystal (*F*, *S*, *K*) faces, surface stress and interfacial tension, thin films, surface roughening and surface melting. The equilibria between small and large phases (droplets, clusters) as well as the equilibrium shapes of crystals (Wulff theorem and Herring generalization) are also considered. Part III deals in depth with nucleation. After presenting the classic phase approach (Volmer–Weber and developments), the book introduces the atomistic picture based on the concept of chemical polymerization reaction. Chapters 10 and 11 cover homogeneous nucleation, discussing the merits and drawbacks of heterophase-fluctuation and chemical-reaction approaches, while Chapter 12 covers nucleation on foreign substrates, in particular introducing the concept of epitaxy. Some specific cases of nucleation and time-dependent nucleation kinetics are discussed in Chapters 13 and 14. Finally, Part IV considers crystal growth – focusing, in Chapters 15–19, on microscopic processes inherent to the various types of crystal surfaces, usually assuming transport phenomena as non-rate limiting. Some exceptions are, however, the use of fluid-dynamic methods when treating, *e.g.*, morphological stability, and surface and volume diffusion in the BCF theory.

In summary, this volume gives, on one hand, a sound introduction to the atomistics of nucleation and growth and, on the other, offers a rigorous synthesis of a vast, but often entangled, literature, thus bridging the gap between older 'classic' approaches and more recent developments in the field.

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books received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally, a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

Symmetry 2000. Parts 1 & 2. Edited by I. Hargittai and C. Laurent. Pp. xix + 627. London: Portland Press, 2002. Price GBP 110.00, US $165.00. ISBN 1 85578 149 2. These two volumes record the proceedings of a symposium held at the Wenner-Gren Centre, Stockholm, Sweden, in September 2000. The 34 contributions with a mathematical or scientific basis include at least two of direct crystallographic interest, *The shape of two-dimensional space* by Alan L. Mackay and *Space filling in molecular crystals* by Jack D. Dunitz. 18 contributions have a more artistic or cultural bent, including one of the more (unintentionally) hilarious pieces I have come across in many years, *Symmetry as a quality indicator of individuals: examples from studies of animal welfare, disease, and sexual selection* by Anders Pape Møller, which references, *inter alia*, the original used-T-shirt sniffing studies of S. W. Gangestad and R. Thornhill.