International Union of Crystallography

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Eleventh International Congress of Crystallography Communicated Abstracts Supplement to *Acta Crystallographica*

The abstracts of papers communicated to the Eleventh International Union of Crystallography, Warsaw, Poland, 3–12 August 1978, have been published as a Supplement to *Acta Crystallographica*, Section A. Defects in the binding of many copies of the Supplement have delayed its publication considerably. Although the Supplement is numbered Part S4 of Volume A34 and is dated 1 August 1978, the copies were not received from Poland by Munksgaard for distribution to subscribers until 15 January 1979. One copy of the Supplement has now been sent to every subscriber to the Union's journals, whether they subscribe to one or both journals. The Union regrets any inconvenience caused by the delay in publication of the Supplement.

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Dimensions of Material Deposited under the Supplementary Publication Scheme

The specification of the dimensions of material for deposit, given in *Notes for Authors* [*Acta Cryst.* (1978). A34, 149], has led to some confusion. In future, the dimensions of all text and tables intended for deposit should not exceed the dimensions of the A4 International Paper Size (210 × 297 mm), although the paper size may be greater. In the case of graphical material, under exceptional circumstances illustrations of greater dimensions (up to 390 × 285 mm) may be acceptable.

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

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Topics in applied physics. Vol. 22. X-ray optics. Applications to solids. Edited by H. J. QUEISSER. Pp. xi + 227. Berlin: Springer, 1977. Price DM 76·00, US $35.00.

This book consists, apart from an introduction by the editor, of five reviews on recent developments in the production of X-rays, on some of their uses in technology, metrology, materials science or basic physics, and on their visual detection. As a bonus, some neutron optics is also included.

The first paper, on high-brilliance X-ray sources, was written by M. Yoshimatsu and S. Kozaki, both from Rigaku Denki Company, one of the two present manufacturers of rotating-anode generators, and it deals almost exclusively with such instruments; synchrotron radiation is left for a following volume in the series. It provides a well documented, and on the whole rather clear, analysis of the physical and technological limitations of high-brilliance X-ray generators, which can also help to understand the operation of lower-brilliance demountable generators.

The second and longest paper in the book is that on X-ray lithography, by E. Spiller and R. Feder from the IBM Yorktown Heights Laboratories. In the standard technology of large-scale integrated electronics, the factor limiting integration is diffraction of the light used in the various lithographic processes involved; one of the ways of pushing back the limit is to use shorter wavelengths, hence X-rays. The authors discuss the ingredients of this developing technique, from the X-ray wavelength range to be preferred and the corresponding sources, *via* the resists, alignment procedures and subsequent processing steps, to applications and outlooks.

Apart from its obvious interest to those working in the field of micro-electronics, this article appears valuable to crystallographers as a way of understanding the technical issues at stake in the discussions, presently carried out in several countries, on the possibility of building dedicated storage rings for the production of X-rays solely or partly for this industrial application.

The third paper, on X-ray and neutron interferometry, is by U. Bonse, one of the fathers of X-ray interferometry, and W. Graeff, one of his former students now engaged in developing neutron interferometry at the high-flux reactor of ILL in Grenoble. Although they are basically similar in their aim to optical interferometry, these techniques are rather radically different in their principle because Bragg reflection by a perfect crystal has to be used for beam splitting and recombination. They can provide valuable information on materials as well as very basic physics – non-invariance of the neutron wave function under 2π rotation, or phase shift due to gravity and the Earth's rotation, for example – and constitute an elaborate test for the dynamical theory of X-ray and neutron diffraction in perfect crystals. The paper gives a unified, but very condensed treatment of the dynamical theory for X-rays and neutrons, a detailed discussion of the instrumental possibilities and requirements, and a review of the applications.

Section topography is the subject of the fourth paper, by A. Authier. He first sets out the principles of X-ray and neutron topography, then gives a discussion of the dynamical

theory of X-ray propagation in perfect and distorted crystals which, although very concise, emphasises physical discussion of the main results. He then discusses the intricacies of the images of dislocations and of planar defects on section topographs, drawing attention to the wealth of detailed information about the defects that can be obtained from a careful analysis of the images, with the help of computer simulations in some cases.

The last paper, on live topography, by W. Hartmann from Stuttgart, is a review of the direct display systems that have been used for the instantaneous display of X-ray topographic images on television screens, an old dream of all topographers. In conjunction with the increasing availability of the synchrotron radiation sources as well as of the high-brilliance X-ray tubes discussed in the first part of the book, they open up new avenues of research on time-dependent processes.

X-ray optics is an impressive body of up-to-date information on very different areas of X-ray physics. This very diversity makes it regrettable that the authors, all of whom are pioneers in the fields they cover, should in some instances have omitted material useful to the layman, such as, in the case of X-ray lithography, comparison with standard technology or, for interferometry, introduction of the index of refraction for X-rays and neutrons. The basic results of the dynamical theory of diffraction are duplicated in Bonse & Graeff's and Authier's papers, in both cases a bit too concisely for a newcomer to become familiar with them; but this still seems to have been the better solution to a rather impossible problem, and the use of different notations will help the reader tackle the original papers by the two schools. On the whole, the text is very well written, the photographs, SEM pictures and X-ray topographs are splendidly reproduced, undefined quantities in equations and misprints are few, there are no less than 556 references and the subject index is excellent.

This book will surely be most welcome to all those interested in X-ray and neutron physics. It will also be very useful to research workers in micro-electronics, as well as to all crystallographers contemplating the purchase of a rotating-anode generator. It should therefore have considerable success.

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Magnetism and metallurgy of soft magnetic materials. By C.-W. CHEN. Pp. xviii + 571. Amsterdam: North-Holland, 1977. Price $71.50, Dfl 175.00.

This is another useful book in the series *Selected Topics in Solid-State Physics*. It deals mainly with soft magnetic materials, which are technologically and economically the most important of all magnetic materials. The book covers a sufficiently wide range of topics to be of interest to engineers and metallurgists as well as physicists. The first four chapters deal with basic principles. This part of the book is relevant to all magnetic materials and is useful to anyone seeking a general introduction to ferromagnetism and ferrimagnetism. Chapter 5 deals with metallurgical aspects, with particular reference to soft magnetic materials. Chapter 6 describes applications, with sections devoted to each of the main types of materials. The final chapter is concerned with special topics, of which the author has singled out two as being of special importance: radiation effects and bubble domains.

The book is not restricted to metallic materials, as the title might suggest, but includes insulators as well. The use of the word 'metallurgy' in the title is intended to imply merely that the book deals not only with the physics of materials, but also with the technology of their preparation and the relationship of their properties to their structure. Bringing together topics which are closely related but are nevertheless rarely contained in one work is a great virtue of the book. The discussion of all topics is thorough and comprehensive, and the book on the whole is very informative and readable. The selection of special topics is rather odd however. The section on radiation effects is very appropriate, but the section on bubble domains does not really fit in a work concerned mainly with soft magnetic materials. Books already exist on bubble domains and the information contained in this book can conveniently be obtained elsewhere. Instead, it would have been far more useful to have included a section on metallic glasses.

There are a few minor points on which the book could be misleading. Current is a scalar quantity; equation (1.4), in which it appears as a vector, implies that the field in a solenoid is parallel to the current. Two of the magnetization configurations shown in Fig. 3.12 are incorrect, as they contain charged domain walls. In Chapter 5, § 2.3, the possible Burgers vectors in f.c.c. materials are incorrectly stated. In Chapter 6, § 3, it would have been useful to have had a more detailed discussion of domain walls in thin films, including two-dimensional walls. The Q value of cobalt is nearer 0·4 than 0·1 as stated in Chapter 7, § 2.1; although it is still less than the value 1 supposedly needed for the formation of bubble domains, they have in fact been observed in cobalt, and have provided the only direct evidence for the presence of Bloch lines in bubble walls.

The author has deliberately avoided referring to work published before 1948. This will be regretted by some readers who might wish to consult earlier references.

The criticisms are, however, very minor. The book is highly recommended to readers who need an introduction to the subject at postgraduate level as well as to those intending to study the subject in detail. It will be found extremely useful to anyone doing research in fields related to soft magnetic materials.

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