## Crystallographers

*This section is intended to be a series of short paragraphs dealing with the activities of crystallographers, such as their changes of position, promotions, assumption of significant new duties, honours, etc. Items for inclusion, subject to the approval of the Editorial Board, should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 5 Abbey Square, Chester CH1 2 HU, England).*

Dr **W.H. Barnes** died on 25 October 1980. A full obituary will be published in *Acta Crystallographica*, Section A.

Professor **B. N. Delaunay**, a prominent Soviet geometrician, died on 17 July 1980, aged 90. He was a corresponding member of the Academy of Sciences of the USSR, a member of the Akademie der Naturforscher 'Leopoldina' Halle, a Fedorov prizewinner and a Lobatchevsky International prizewinner. He was also famous not only as an outstanding scientist but as an experienced mountain climber. In his creative activities Professor Delaunay had the gift for finding simple and clear interpretations of the most complicated theoretical subjects. His superb lectures on geometry and the mathematical foundations of crystallography, which he delivered at the Moscow and Leningrad State Universities, are still remembered with admiration by the audience. Crystallographers pay tributes to him for his theoretical works which ensured the high mathematical level of modern crystallography.

Professor Delaunay's first investigations on crystallography, published in 1926–1934, were devoted to the problems of classification of lattices into 24 kinds and of the unique choice of a primitive unit cell. The results of some of the researches of these series were published in the 2nd volume of *International Tables*. His paper concerning the mathematical foundations of the structural analysis of crystals (published in 1934) has become a standard reference for crystallographers. Twenty five years later, having resumed crystallographic investigations, Professor Delaunay achieved remarkable results pertaining to the theory of homogeneous partitioning of a plane and of space, results which so far have remained unsurpassed. His brilliant monograph on the local determination of regular systems of points which he completed, together with his students, shortly before his ninetieth birthday was a bright culmination of his crystallographic investigations.

Professor Delaunay leaves behind a memory precious to his colleagues and to all the people who knew him as a classic figure of mathematics and crystallography, a noble knight of truth and simplicity in science, a considerate teacher, and the embodiment of physical vigor and humor, which did not leave him till the last minutes of his life.

Dr **R. Henderson** and Dr **N. Unwin** of the Medical Research Council, Cambridge, England, have been awarded the first Ernst Ruska prize for their high-resolution electron microscopy and electron diffraction studies of the structure of proteins. Dr Ruska was a pioneer in electron microscopy.

Dr **Mary Porter**, who died on 25 November 1980, aged 94, was one of the last surviving crystallographers of the era before the application of X-rays to the subject. Professor H. Miers encouraged her early interest in crystallography, which she studied with him during a series of visits to Oxford between 1902 and 1908. Subsequently she worked with A. E. H. Tutton in London, P. H. von Groth in Munich and Victor Goldschmidt in Heidelberg. She returned to Oxford, being Lady Carlisle Research Fellow at Somerville College between 1919 and 1929, and was awarded a DSc in 1932. She was an Honorary Research Fellow of Somerville College from 1949 until her death. Her main work was *The Barker Index of Crystals, A Method for Identification of Crystalline Substances*, published in seven volumes from 1951 to 1964.

While Professor **J. B. Cohen** is continuing as a Co-editor of *Journal of Applied Crystallography* until the end of the Twelfth General Assembly and Congress of Crystallography in Ottawa, August 1981, as reported in *Crystallographers* in the December 1980 issue, new submissions should be sent to Dr **H. Yakel,** Metals and Ceramics Division, Oak Ridge National Laboratory, Tennessee.

## Notes and News

*Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 5 Abbey Square, Chester CH1 2HU, England).*

### Historic Scientific Instruments

The Scientific Instrument Commission of the Division of History of Science of the International Union of History and Philosophy of Science aims to stimulate the production of inventories and catalogues of historic scientific instruments and facilitate the exchange of information in this field. Priority is given to the latter objective and meetings will be held in Bucharest in 1981 and Kassel in 1982. National inventories of scientific instruments are available for Belgium, France, Italy, Poland and the USSR; one for the UK should be published in 1981. Anyone interested in these activities should write to Lt Cdr H. D. Howse, National Maritime Museum, Greenwich, London SE10, England, or Dr G.L.E. Turner, Museum of the History of Science, Oxford, England.

## 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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### **Molecular beam epitaxy.** Edited by *B. R. Pamplin*. Pp. v + 174. Oxford: Pergamon Press, 1980. Price US $ 35.00, £ 15.75.

'Molecular beam epitaxy (MBE) is a new technique of crystal growth that is rapidly expanding in research and applications. This book, the first on the subject and written by leading practitioners of the art, is a collection of articles which introduces the reader to the use of MBE in the III–V and IV–VI compounds and alloys and indicates the semiconductor and integrated optics reasons for using the technique.' Thus the book introduces itself on its back cover.

This 1980 volume is in fact a hard-cover version of a 1979 issue of *Progress in Crystal Growth and Characterization*, a review journal which describes its purpose as being 'addressed to (those) who are looking for a comprehensive summary and review of a subject in which they have no expert knowledge.' The reader may therefore expect this book to provide a good introduction to MBE. In fact, while the book's seven articles are interesting and informative, a good introductory chapter is lacking.

Actually, the editor, Dr Pamplin, has supplied an introduction. Less than two pages long, it is probably the most thought provoking part of the book. In this introduction, Dr Pamplin raises the possibilities of adapting MBE to space processing in orbital laboratories and to the creation of new, highly complex inorganic crystals. But the introduction also is an apology, since the articles in this volume reflect the conservative reality imposed upon MBE research and development by

the commercial forces which have provided most of the financial support.

Typical of a journal, each of the seven articles is quite independent; there is little cross referencing, there is much repetition. The sequence of the articles seems to be random. For example, both the first and last articles deal with modulated structures. The former describes layered structures having periodic compositional modulation, while the latter describes periodic doping. Such structures are receiving a good deal of attention these days because they may prove useful in new electronic and optoelectronic devices and because they exhibit interesting semiconductor phenomena. MBE is well suited to the preparation of these complex structures, especially when the modulation period is in the range of monolayer spacings. However, many interesting structures involve layer thicknesses in the range of hundreds or even thousands of ångströms. In this range MBE is not unique. Chemical vapor deposition using metalorganic sources has been used to prepare structures having layer thicknesses of less than 100 Å. This alternative to MBE is referred to only once in the book, although the failure of earlier chemical vapor deposition techniques is mentioned.

A focus on the capabilities of MBE rather than an objective description of the method and comparison with other methods is, perhaps, to be expected in articles written by 'leading practitioners of the art.' The first two articles, the former describing the compositionally modulated structures and the latter describing MBE hardware, tend to convey the idea that all of the problems of preparing materials by MBE have been solved. It is only upon reaching the third article, which is a very clearly written introduction to the thermodynamic basis for controlling point defects and dopants in compound semiconductors, that some of the difficulties and limitations of MBE become obvious. In particular, many atomic or molecular species are not compatible with each other or with existing MBE technology.

The third article thus deals with certain aspects of crystal growth by MBE. Some other aspects form the subject of the sixth article, which presents some results from studies of surface physics and chemistry. This article would have been better if it included more introductory material for the benefit of readers who are not familiar with the rather broad range of surface analytical techniques involved.

The other two articles in this book consider the application of MBE to optical devices of a more conventional nature than the modulated structures. One of these articles is a well written introduction to integrated optics employing III–V semiconductors, specifically $Ga_{1-x}Al_xAs$. The various optical components are described along with methods for their fabrication by such means as MBE through shadow masks.

The remaining article, which is a good review of IV–VI optoelectronic devices, is remarkable for several reasons. It is by far the longest article; occupying more than one quarter of the volume's 170 pages. It is the only article which does not primarily focus on III–V materials. It is an article in which the authors state that 'the choice of vacuum deposition technique ... may be regarded as a matter of taste,' rather than positing the superiority of MBE. In fact, the growth technique employed by these authors is so much different from the one used for III–V's that it hardly seems correct to call both techniques MBE. This is the point in the book where the reader wishes there had been an introduction in which the term MBE were clearly defined. In any case, readers who are interested in MBE are likely to find that this lengthy article tells them more than they ever wanted to know about IV–VI devices. This article also suffers from a severe case of a syndrome which afflicts the entire book and which is commonly observed in journals that are produced by photocomposition from the authors' typescripts; namely typographical (and lay-out) errors.

The reader of this review may now wish to return to the first paragraph and underline 'collection of articles,' 'III–V,' and 'integrated optics reasons for using the technique', for these are the key words in describing this book. Potential readers of the book would do well to treat it for what it is, an issue of a journal which is dedicated to publishing brief introductory reviews. Readers who seek the general introduction to MBE which this book lacks may find a recent review by M. B. Panish (*Science*, Vol. 208, 23 May 1980, pp. 916–922) to be useful. However, in common with most of the articles in the book, Panish's review is one-sidedly pro-MBE, in spite of the fact that his laboratory is known to be expanding its research on metalorganic chemical vapor deposition.

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**Asbestos. Vol. 1. Final report of the Advisory Committee; Vol. 2. Papers prepared for the Advisory Committee.** Committee Chairman *W. Simpson*, Health and Safety Commission of Great Britain. Pp. 100 (Vol. 1), pp. 103 (Vol. 2). Her Majesty's Stationery Office, 49 High Holborn, London, WC1V 6HB, 1979. £5.00 each volume.

These two volumes comprise the report of the Advisory Committee on the use, control, and health effects of asbestos in society. This work should be of interest to those who work with asbestos and other fibrous materials as well as those who have a general interest in environmental health problems. An extensive summary of the health effects associated with inhalation of asbestos dust by workers in many industries and in many parts of the world is given. Asbestos, considered to be the fibrous form of any one of six minerals, chrysotile, amosite, crocidolite, tremolite, actinolite, and anthophyllite, may cause asbestosis (a scarring of the lung), lung cancer, or mesothelioma (a cancer of the lining of the chest and abdominal cavity). Certain physical properties such as size and shape, and possibly certain chemical and structural properties, are suggested as reasons why these fibrous minerals are particularly dangerous to humans.

The Simpson Report, which is written by a large number of experts in the various fields of asbestos use, gives a description of the asbestos minerals, the distribution of asbestos in the workplace, the problems of asbestos dust measurement and control, a discussion of asbestos exposure to the general public, the health effects of asbestos, the nature of asbestos products and their possible substitutes, and new proposals for legal and administrative control of asbestos use.

In this reviewer's opinion there is no document to compare with the Simpson Report in its evenhanded and scientifically thorough presentation of the complex problem of asbestos and health. The Report clearly recognizes the significant differences in the health effects of the various forms of commercial asbestos; crocidolite is considered so dangerous that its complete ban is proposed whereas the use of chrysotile within