X-ray microscopy

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Usp. Fiz. Nauk **152**, 352 (June 1987)

X-Ray Microscopy/Eds. G. Schmahl and D. Rudolf. Springer-Verlag, Berlin; Heidelberg; New York; Tokyo, 1984. pp. 345.

X-ray microscopy is intermediate between optical and electron microscopy. Utilizing soft x rays one can obtain higher resolution than with visible light. At the same time compared to electron microscopy thicker samples can be studied which have not been subjected to special treatment, and this is particularly important for the study of biological objects.

The publication under review contains a report of the symposium "X-ray microscopy" organized by the Göttingen Academy of Sciences in September 1983. The first part of the collection of articles demonstrates the present-day development of powerful sources of soft x rays. The second part is devoted to a description of the different elements of x-ray optics. In order to obtain high resolution with x rays high quality condensers and optical elements of particularly high resolution are required. The optical elements must be prepared with a very high degree of precision. In parts III, IV and V a description is given of detectors of x rays, x-ray microscopes, contact microscopy and their application. The sixth part is devoted to a description of holography using soft x rays.

The collection of articles examines, basically, the application of x-ray microscopy for the solution of biological and medical problems. Also the application of x-ray microscopes for a quantitative microanalysis of surfaces of solids is presented. Evidently in the very near future the application of the methods described in the book for the solution of a wide range of research problems will be possible.

The problems discussed in the book under review may be of interest for experimenters and theoreticians engaged both in the development of analytic methods of studying materials, and also in their concrete applications.

Problems of integrated optics

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Usp. Fiz. Nauk **152**, 353–355 (June 1987)

Integrated Optics: Proceedings of the Third European Conference ECIO'85—Berlin, 6–8 May 1985/Eds. H.-P. Nolting and R. Ulrich. Springer-Verlag, Berlin; Heidelberg; New York; Tokyo, 1985. pp. 242 (Springer Series in Optical Sciences V. 48).

The book under review is the collection of texts of papers (46 papers, including 5 review papers) presented at the third international conference on integrated optics which was held in West Berlin from 6 to 8 May 1985.

The collection of articles gives a contemporary overview of the rapidly developing field associated with the study and application of optical phenomena in thin-film waveguide structures. On the basis of methods of integrated optics devices are now being developed which govern the propagation of optical radiation in thin-film waveguides (deflectors, modulators etc.), at the present time they find various applications in systems processing optical signals. Of particular significance is the miniature nature of these elements, the smallness of the amounts of energy utilized by them and their compatibility with fiber lightguides.

The aim of the conference is to bring out the most promising tendencies in the development of integrated optics and of its possibilities in the development of integrated optics (IO) elements on the basis of present-day technology.

All the reports presented at this conference were divided into five groups: Physical effects in IO structures; materials and technology of preparing IO elements; semiconductor integrated optics; modulators; applications of IO elements. In each of these groups one invited review paper was given on the pressing problem of integrated optics. In papers following them more narrow physical and applied problems of present-day integrated optics were examined.

The large review paper of the first group considered one of the most promising directions of physical investigations in present-day integrated optics—nonlinear integrated optics (C. T. Seaton, G. I. Stegeman, W. M. Hetherington, H. G. Winful). The strong concentration of the energy of optical radiation in IO waveguides leads to the fact that the nonlinear-optical effects play an important role in the process of propagation of radiation along a waveguide. The authors restricted themselves in the paper to an examination of nonlinear-optical phenomena brought about by cubic nonlinear susceptibility. The principal attention was devoted to an examination of such phenomena as the appearance of nonlinear waveguide modes, some of which do not have linear analogs, nonlinear distributed feedback and its applications,