Advances in Electronics and Electron Physics, Supplement 16 — The Beginnings of Electron Microscopy
Edited by Peter W. Hawkes

(Academic Press, Inc., London, 1985)

Electron microscopy was born on April 7, 1931 when Ruska focused the 17x magnified image of a mesh onto a flourescent screen. During the next 20 years, the electron microscope advanced rapidly from a laboratory demonstration to a state-of-the-art research tool in routine use for studies ranging from metallurgy to cell biology. In this book, 17 of the pioneers who accomplished this transformation tell their own stories. The result is a book that will be enjoyed by anyone with an interest in the electron microscope, and the history of science.

The chapters vary widely in style and content, from Delong's sober report of Czechoslovakian activities to Le Poole's racy and exciting story of work in wartime Holland. But all are engrossing and manage to convey the enthusiasm and excitement of those early days. Surprisingly some of the heat of controversy and rivalry can still be sensed as well and one aspect of this, the "patenting" of the electron microscope by Rudenberg, is well covered by P. W. Hawkes in a summary chapter. Prof. C. Susskind of Berkeley also contributes a biography of L. Marton that strongly reinforces Marton's claim to be regarded as one of the most important figures in the field during this period.

The book has other claims beside the interest of its anecdotes. In particular it contains a fascinating collection of early and important electron micrographs, many of which have probably never been published. More than anything else these demonstrate the experimental skill with which these workers were able to coax their primitive, home-built instruments into performing better than they had any right to expect. Each chapter is also complemented with a detailed bibliography that will form a useful resource for future historians of microscopy, as many of the references seem to have been overlooked in other surveys of this period.

Editing by P. W. Hawkes is immaculate and the production, in the usual style of *Advances in Electronics and Electron Physics*, results in a volume that will be a handsome addition to any bookshelf. Perhaps now we can hope for a sequel that will do the same service for the "Golden Age" of electron microscopy in the 1950s, and allow us to hear from the figures such as R. D. Heidenreich, R. Castaing, and P. B. Hirsch who made possible the instruments and techniques that we benefit from today.

Reviewer: David C. Joy is an electron microscopist and a Member of the Materials Physics Research Department at AT&T Bell Laboratories in Murray Hill, NJ. His research interests include analytical SEM and STEM development and application.

Glass: Science & Technology Volume 2 — Processing I
Edited by D. R. Uhlmann and N. J. Kreidl

(Academic Press, Inc., 1984)

This volume represents another excellent addition to this series of books concerning the science and technology of glass. There are nine chapters; the topics include glass-melting, gel processing, optical waveguides, solder glasses, glass coatings, glass spheres, flat glass manufacture, container manufacture, and tubing and rod manufacture. Chapters on glassmelting and gel processing are especially science-oriented, whereas the other chapters are more technological and/or engineering in nature. The discussions of glass coatings and optical waveguides cover a wide spectrum of vapor and solution deposition methods.

All of the chapters are tutorial in nature, and thus, the volume provides an exceedingly useful reference book. The authors of each chapter are well-recognized experts in their field who have, in most cases, included a nice historical perspective on each topic.

Reviewer: Prof. Carlo G. Pantano teaches undergraduate and graduate courses in glass science at Pennsylvania State University. His research efforts focus upon surface chemistry of glass and processing of amorphous thin films.

Semiconductors and Semimetals, Volume 21— Hydrogenated Amorphous Silicon, Part B, Optical Properties
Volume edited by J. I. Pankove

(Academic Press, Inc., 1984)

Optical properties in a hydrogenated amorphous silicon (a-Si:H) are mainly discussed in this volume. The chapters include the following descriptions for a-Si:H: the absorption edge, defect states, vibrational spectra, electroreflectance and electroabsorption, Raman scattering, luminescence, photoconductivity, relaxation process, and metastable effects. New measuring techniques recently developed are also introduced. The reader can readily gain a fundamental understanding of a-Si:H through brief historical reviews and discussions based on extensive experimental data in Chapters 2 - 8.

Chapter 3 discusses photothermal deflection spectroscopy. Using this technique, an absorption coefficient is determined in a-Si:H with great sensitivity in comparison with conventional transmission and reflection methods. This technique is also useful for estimating energy levels and the number of defects in the gap.

Chapter 9 introduces time-resolved absorption spectroscopy as a useful measurement technique for the investigation of the relaxation process of carriers in the picosecond time domain. This technique seems to make clear the geminate recombination process in a-Si:H as reported in chalcogenide glasses.

It is indispensable to clarify "the Staebler-Wronski effect (reversible changes in dark conductivity and photoconductivity by optical illumination and subsequent annealing)" for understanding the physical nature of a-Si:H and for its applications to devices. This effect is discussed as one of the irradiation-induced metastable effects in Chapter 11. Luminescence fatigue and enhancement of an emission band are also described as evidences for the creation of metastable defects by optical illumination. The reader seeking a thorough understanding of the Staebler-Wronski effect and physical phenomena related to metastable defects should see the other volumes, Parts A (preparation and structure) and C (electronic and transport properties), as well as this volume.

It is well known that optical properties at the surface of a-Si:H are different from those in the bulk. New contactless measurement techniques to get the information directly on the surface of a-Si:H are introduced in Chapters 1, 3 and 12. The techniques will be useful tools to explore the physics at several interfaces of heterostructure, e. g., a-SiC:H/a-Si:H, Si_3N_4/a-Si:H, a-Si:H/electrode materials, and a-Si:H/substrate.

This volume is a valuable resource to any scientist or engineer who is interested in the optical properties in a-Si:H and other amorphous materials. However, the whole aspect of physics in a-Si:H is not fully understandable from just this volume. The other volumes, Parts A and C, should also be studied. The abundant references allow the reader to understand readily the key points raised in each of the chapters.

Finally, more recent information on optical properties in a-Si:H can be followed by referring to the conference proceedings on "Optical Effects in Amorphous Semiconductors" held in Utah in 1984.*

*This proceeding is published as AIP Conference Proceedings No. 120.

Reviewer: Shuji Komura is with the Institute of Chemical and Physical Research in Japan.