Third-Generation Hard X-ray Synchrotron Radiation Sources. Edited by D. M. Mills. New York: John Wiley, 2002. Price GBP 69.95, ISBN 0-471-31433-1.

As expected, third-generation hard X-ray synchrotron radiation sources did not only speed up data taking with techniques known before but opened the door to new science. The useful spectral range was extended up to some 100 keV photon energies, and various techniques for focusing hard X-rays to even the submicrometer range made X-ray scattering a most attractive tool in modern nanoscale science. Samples under extreme external conditions, such as pressures up to 300 GPa, are studied in detail; the use of phase-contrast imaging allows for tomographic reconstruction of soft matter structures with spatial resolution in the micrometer range; microfluorescence studies with high spatial resolution became a very important tool for environmental research; inelastic X-ray scattering experiments widen most significantly the accessible range for the investigation of dynamics in condensed matter research; and first time-resolved studies in the picosecond time domain became possible. The progress made in the field of surface science is also very impressive where, as an example, the strain field caused by quantum dots in the substrate can be studied in detail by analysing the corresponding diffuse scattering. Needless to say, today crystallography beamlines at third-generation synchrotron radiation facilities are indispensable for modern structural biology.

As mentioned by the editor, not all the new developments due to the availability of extremely reliable third-generation synchrotron radiation facilities could be presented in the book. The following areas are discussed: fundamentals of hard X-ray synchrotron radiation sources; X-ray optics; coherent X-ray diffraction; X-ray microbeam and microscopy techniques; imaging; high-pressure techniques; high-energy X-ray scattering; new directions in X-ray magnetic scattering; macromolecular crystallography; and picosecond structural studies using pulsed synchrotron radiation.

Although the emphasis in this book is mostly on the demonstration of progress made in X-ray optics and instrumentation in general, instructive examples of successful application of the new techniques are well presented and documented in the lists of references. The chapters on the fundamentals of synchrotron radiation sources and on coherent X-ray diffraction are almost tutorial in nature and probably very attractive for the non-specialist. The chapter on time-resolved studies opens the reader's imagination to the revolutionary applications of X-rays which will become possible once the new light sources like free-electron lasers are available.

The individual chapters of this book edited by Dennis M. Mills are well written and will be very useful for the general user of synchrotron radiation facilities as well as for the expert who will find easily his way to the key features of the most recent developments in research with X-rays. The editor and the 24 authors from different fields of science are to be congratulated on this nice and most instructive book.

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Chemical Applications of Synchrotron Radiation, Vol. 12, **Advanced Series in Physical Chemistry. Part I: Dynamics and VUV Spectroscopy. Part II: X-ray Applications.** Edited by Tsun-Kong Sham. Pp. 1304. Singapore: World Scientific, 2002. Price USD 198, GBP 132, ISBN 981-02-4480-0 (set).

The goal of this *Advanced Series in Physical Chemistry* is to provide texts to support the teaching of graduate courses that are focused on modern topics and new developments in experimental and theoretical physical chemistry. The reviews presented are set in the context of the applications of synchrotron light sources over the past 50 years, to the present, so-called third-generation, sources that are versatile and powerful radiation sources from the below-red to the X-ray regions.

Given the wide applicability of synchrotron light and the potential significance of the new investigations that are possible, it is timely to examine the impact that synchrotron light has made and will continue to make on chemical research, in its widest sense. With this objective in mind, the editor of this two-part volume invited contributions from practitioners who are at the forefront of particular aspects of this field of research. The authors and editor are congratulated on achieving their individual and collective aims. Thus, the individual chapters summarize most of the significant developments in the last decade in chemical and related research that have been achieved using synchrotron light sources. The utilization of the radiation as a probe as well as an energy source is emphasized.

This book is organized in order of increasing photon energy. Part I deals with the applications of low-energy photons and covers areas such as gas-phase photodissociation reactions and dynamics, soft X-ray fluorescence, IR and photoemission analysis of surfaces, spectroscopy of organic and polymeric materials, catalysts, electronic and magnetic materials, and spectromicroscopy. Part II encompasses applications using soft to hard X-rays, including spectroscopy of surface and thin films, XAFS, diffraction and scattering, and several technological applications, namely the microprobe, photoetching and tribology.

The material is presented in a clear, concise and authoritative manner and each chapter contains figures that complement the text, together with a comprehensive list of relevant references.

This text is essential for library purchase and, for those engaged in this field of research and/or teaching graduate courses that cover the chemical applications of synchrotron radiation, personal purchase is recommended.

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