materials, metallic glasses, surfaces and interfaces. Specific topics in the first volume include: *Localization and disorder*, *Metals and alloys*, *Fluids*, *Excitons and electron–hole droplets*, *Semiconductors*, *Defects*, *Impurities*, *Spin waves and magnetism*, *Superionic conductors*, *Polarons*, *Molecular crystals*, *Superconductivity*, and *Spin glasses*.

The papers in the second volume are mostly presented in the form of extended abstracts, containing one or two figures and a brief list of references. These often give the impression of being work in progress, and as such can be particularly useful in providing a picture of what people are working on currently. The average length of the papers is slightly greater than seven pages, and many are concise and useful. The topics which are included are divided into eight basic sections which are: *Metals and alloys*, *Dielectric properties of metals*, *Disordered systems*, *Amorphous semiconductors*, *Glasses*, *Chalcogenides*, *Surfaces and interfaces*, and *Molecular crystals*.

As in Vol. 1, the papers in Vol. 2 are a balanced mixture of theoretical developments and experimental results. The section of disordered systems, for example, begins with a theoretical treatment of the thermodynamic properties of quenched disordered systems by A. Huber; next are presented results on short-range order in liquid selenium–tellurium systems by Bellissent & Tourand. These are then followed by five additional papers involving one-dimensional disordered systems (two papers), conductivity calculations for disordered systems, transport properties, and finally a study of critical behavior near the conductor–insulator transition.

These volumes are recommended to researchers who are active in condensed-matter physics and materials science.

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Developments in high power lasers and their applications. Edited by C. Pellegrini. Pp. xi + 477. Amsterdam: N. Holland, 1981. Price US $80.75, Dfl 190.00.

This book gives a very broad treatment of the developments and the applications of high-power lasers, over the world. In particular, the original development of the theory is given; also many theories and experiments of researchers worldwide are included. The authors expect the readers to have a knowledge of Maxwell's equation, Schrödinger's equation, quantum statistics, and so on, so this book is at the level of a text for a graduate course in either physics or electrical engineering.

In the first chapter, *Introduction to high-energy lasers*, several types of high-power lasers (CO_2, CO, HF, iodine, glass, eximer) are treated theoretically, with rate equations or with photon transport equations.

In *Laser-fusion and laser–plasma interactions*, laser–plasma interactions are discussed theoretically (as stimulated scattering processes by mode coupling, resonance absorption mechanism, ponderomotive force) and are briefly compared with experimental data.

The chapter *High-power, short pulse* CO_2 *laser systems for inertial-confinement fusion* treats high-power laser operation basically, and pulse propagation theoretically. Retropulse protection, suppression of unwanted parasitic oscillation, power amplifier technique and alignment techniques are explained, with many illustrations.

The next chapter is on *The high-power iodine laser*. The iodine laser is the newest high-power short-pulse laser and has quite recently been demonstrated to be successful in fusion experiments. Fundamental reactions of this laser are explained; also treated is pulse propagation theory. A description of the 1 TW iodine laser is added.

The next articles, *High-power tunable lasers and their applications to photochemistry and isotope separation*, *Photophysical and photochemical properties of gaseous* UF_6, and *High-power 16 micrometer lasers for uranium isotope separation*, deal with infrared tunable lasers (HF, HCl, CO, CO_2, N_2O, *etc.*), develop the theory, and show applications to laser chemistry and uranium isotope separation. Many topics in this area are illustrated graphically. In a chemical laser, the levels involved in the stimulated emission process are inverted directly as a result of chemical reaction. In the article, *High-power chemical lasers*, this laser is carefully defined and some examples (HCl, HF, *etc.*) are used, to illustrate the physical principles, or chemical explanation.

In the last three articles, *Single-particle theory of the free-electron laser*, *Coherent dynamics of the free-electron laser*, and *The free-electron laser: storage ring operation*, theories for the interaction between particles and fields are outlined, and some experimental data for the FE laser are given, and discussed.

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EXAFS spectroscopy: techniques and applications. Edited by B. K. Teo and D. C. Joy. Pp. viii + 275. New York: Plenum, 1981. Price US $32.50.

This is the first book devoted entirely to the expanding field of X-ray spectroscopy. EXAFS refers to those oscillations of the X-ray absorption coefficient on the high-energy side of an absorption edge, which have been known for 50 years as the Kronig oscillations. However, it remained a confusing scientific curiosity up to 1970 when Sayers, Stern & Lytle demonstrated, using Fourier transforms of the modulations, that EXAFS is due to the backscattering of the photoelectron by a few shells of neighbours around the excited central atom. A simple single scattering theory could then be elaborated and its accuracy as well as its limitations have now been extensively checked. It is now well established that nearest-neighbour distances can be determined from EXAFS data within ±0·01 Å, and coordination numbers within ±10%, though in special circumstances (heavily disordered systems) the accuracy may be poorer.

EXAFS spectroscopy, which is a collection of papers written by some of the best experts in the field, will convince the reader of the attractive features of EXAFS. First, it can be used for a wide variety of materials since it does not require single crystals. But its major advantage is its unique ability to focus on the local environment of any component in a multicomponent system (except very light atoms). This makes EXAFS a powerful tool for structural studies of complex systems, so that it will undoubtedly be used more and more for crystallographic studies in conjunction with diffraction experiments.

The first part of the book is devoted to most of the fundamental problems which have been encountered – some of them being still unsolved – in the process of making EXAFS a reliable and accurate tool for local structure determination. This part is excellent and will be useful to all the crystallographers who would like to understand the basic physics underlying EXAFS and to be aware of the strength of the technique as well as its limitations. Most of the treatments are very detailed and quite up to date, and in my opinion they are also of great interest to active workers in the field. I would like to mention the very comprehensive and clear introduction to the theory and technique by B. K. Teo, which is a brief and bright description of the method.

The second part of the book is devoted to specific applications of EXAFS mainly in materials science, though some examples are also found in biophysics and chemistry. It emphasizes the usefulness of EXAFS to study the local structure of disordered systems since EXAFS does not require long-range order. Examples are given in the fields of amorphous materials, liquids and solutions, superionic conductors, catalysts, *etc.* The high sensitivity of the fluorescence detection of EXAFS which makes possible the study of dilute systems (in the range of a few tenths of p.p.m.) is also discussed. The reader will also find many references concerning specific studies performed before 1980. However, some of the papers are not sufficiently comprehensive.

The last part is devoted to another technique for measuring EXAFS oscillations, electron-energy-loss spectroscopy, which could be useful for EXAFS of low-atomic-weight elements.

EXAFS spectroscopy will certainly be followed by several other treatises since the field is expanding so quickly: new experimental techniques (white-beam EXAFS) as well as theoretical treatments allowing the interpretation of the structures close to the edge (XANES) have been developed too recently to be described in this book. However, it will remain for long as an excellent introduction to EXAFS spectroscopy, and a valuable reference book, especially because of the first part which is clear and complete and will be useful for those now in the field as well as those who wish to enter it.

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Physics of graphite. By B. T. Kelly. Pp. x + 477. London: Applied Science Publishers, 1981. Price £48·00.

This is a well-written and well-organized book covering the preparation, structure, mechanical properties, thermal properties and electronic properties of graphite. In addition, there are chapters on the pore structure, and on irradiation damage. There are seven chapters. Each chapter is a self-contained and up-to-date (for a 1981 book) review, with over 100 references typically. There are 34 tables and 107 illustrations. The book is suitable for use as a textbook as well as a research reference.

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