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book reviews

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Quasicrystals. The state of the art. (2nd ed.) Edited by D. P. Vincenzo and P. J. Steinhardt. **Series on Directions in Condensed Matter Physics**, Vol. 16. Pp. xi + 618. Singapore: World Scientific, 1999. Price (hardback) USD 113, GBP 71, ISBN 981-02-4155-0; (paperback) USD 55, GBP 34, ISBN 981-02-4156-9.

Twelve years ago, the first edition of this book was published. It served for several years as a very valuable introduction to quasicrystals and as a progress report emphasizing 'critical experimental developments and important theoretical breakthroughs that have occurred in the four years since, subsequent to the initial excitement surrounding the discovery of quasicrystals'. The slightly enlarged second edition appeared in 1999. Two well written chapters had been added to the 15 mostly unchanged previous ones. In one of them, A. I. Goldman and P. A. Thiel review the experimental progress between 1991 and 1998. In the other one, P. J. Steinhardt himself discusses the Gummelt-cluster approach, which allows the structure of decagonal phases to be described in terms of a single overlapping cluster.

Quasicrystals. The state of the art (2nd ed.) is still an interesting book but it no longer reflects the state-of-the art of quasicrystal research. Today the title is misleading. Too many important experimental and theoretical discoveries have been made since 1990/91 when 15 of the 17 chapters of the book were written. This progress is reflected in the number of papers on quasicrystals that have tripled to much more than 6000 since then. New classes of stable ternary and even binary quasicrystals have been discovered, high-temperature/pressure studies have given new insight into stability and phase transformations, huge perfect single-crystalline samples have been grown and structure and physical properties of quasicrystals have been studied in great detail. Even one of the early paradigms that the negative temperature coefficient of electrical resisitivity should be an intrinsic property of quasicrystals has recently been questioned by experiments on the new binary quasicrystals.

Quasicrystals. The state of the art (2nd ed.) is definitely 'a must' for everybody who is interested in the early years of quasicrystal research. Some of the theoretical chapters are of lasting value such as the one on *Random tiling models* by C. L. Henley. *Matching rules for quasicrystalline tilings* by K. Ingersent or *Growth rules for quasicrystals* by J. E. S. Socolar are still useful to read. However, if one wants to get an easy general introduction into the field, the textbook by C. Janot, *Quasicrystals: a primer*, 2nd ed. (Clarendon Press, Oxford, 1994), would be a better buy. More detailed insight into structure and properties of quasicrystals is imparted by the useful multiauthor book *Physical properties of quasicrystals*, edited by Z. M. Stadnik (Springer, Berlin, 1999). A more mathematical introduction into the current theory of coverings is given in the excellent book on *Coverings of discrete quasiperiodic sets. Theory and application to quasicrystals*, edited by P. Kramer and Z. Papadopolos (Springer, Berlin, 2003).

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Linus Pauling selected scientific papers. Edited by Barclay Kamb, Linda Pauling Kamb, Peter Jeffress Pauling, Alexander Kamb and Linus Pauling Jr. Singapore: World Scientific, 2001. Vols. 1 and 2 set: 1612 pp., USD 114, ISBN 981-02-2784-1; Vol. 1: 864 pp., USD 98, ISBN 981-02-2939-9; Vol. 2: 748 pp., USD 67, ISBN 981-02-2940-2.

Few would dispute that Linus Pauling was the greatest chemist of the 20th century, arguably one of the greatest ever. Imaginative, quantitative, encyclopaedic, selective, omnivorous, lucid, vivid and compelling (in the written and spoken word), he was also a prodigiously hard working and extraordinarily versatile scientist with skills and knowledge encompassing the crystallographic, mineralogical, mathematical, quantum mechanical, nuclear physical, as well as the chemical, biochemical and biological. In all these fields (along with others such as immunology, anaesthesia and evolution) and particularly at the interfaces between them he made decisive contributions. He was both a deep thinker and a problem solver. Just as the English language owes many of its words and metaphors to Shakespeare, so does the vocabulary and language of modern chemical science owe an enormous debt to Pauling.

His published writings number some 1200 in all, of which over 800 are scientific papers and books, produced over the period 1923–1994. His first paper was on the crystal structure of molybdenite (MoS_2). In these two volumes, 144 of his papers are reproduced, preceded by brief introductory assessments of clusters of them that are arranged into four main categories: The Chemical Bond, Crystal and Molecular Structure and Properties, Biomolecular Sciences, and Health and Medicine. The editors, who are his son-in-law, daughter, two surviving sons and grandson, sought the assistance of some notable luminaries (who include Jack Dunitz, Richard Marsh, Harden McConnell, Ray Owen, Alexander Rich and Ahmed Zewail) in deciding which articles to reproduce. The resulting compilation constitutes an intellectual feast. These two volumes are, in effect, an encyclopaedia of modern chemistry, with the important extra quality that it has historical perspective and includes some exhilarating landmark papers which will be consulted for as long as chemistry is taught and pursued.

Soon after the discovery of X-ray diffraction by crystals, the structure of most elements, many simple salts and a small number of complicated substances had been determined by the early 1920s. But the difficulty of finding additional crystalline solids, the structures of which could be completely analysed by the accepted methods (of the Braggs, Wyckoff, Goldschmidt and Pauling himself), was becoming apparent. In 1928, Pauling made a successful attack upon this impasse in his contribution to the *Festschrift* for Sommerfeld (in whose Münich laboratories he learned quantum