

BOOK REVIEW

Chemistry of Microporous Crystals, edited by T. Inui, S. Namba, and T. Tatsumi. *Studies in Surface Science and Catalysis, Volume 60*, Elsevier, Amsterdam, 1991, 384 pp., \$168.50, hardbound. ISBN 0-444-98702-9.

This book is a volume of the proceedings of the International Symposium on Chemistry of Microporous Crystals held in Tokyo on June 26–29, 1990. The objective of the symposium was to present new horizons and developments in the chemistry and application of natural and synthetic crystalline materials having microporous structures. The area of microporous crystalline materials is dominated by zeolites, and as might be expected, about three-fourths of the contributions in this book deal with zeolites and analogous aluminum phosphate materials. Papers address topics in synthesis and modification, diffusion of hydrocarbons, and the use of zeolites to effect a variety of catalytic reactions. A broad cross section of this wide ranging field of study is presented, and various emerging trends are highlighted, including the possibility for highly-selective oxidation of hydrocarbons and the synthesis of fine chemicals using modified zeolites and metallosilicates, as well as continuing work on the synthesis of novel large-pore aluminum phosphates and substituted analogues.

Perhaps more interesting to the readers of this journal are the papers on clays and layered materials. There are four contributions that deal with pillared clays. These are semi-crystalline microporous materials made by propping the layers of smectites apart with small metal-oxide pillars, producing two-dimensional microporous galleries. The effects of the variation in structure and composition of the pillared clays on their physical and catalytic properties are explored. Hydrotalcites are minerals that have positively-charged metal hydroxide layers. They can be pillared with metal polyoxocations, making microporous materials analogous to pillared clays. However, the low thermal stability of the hydroxide layers of the hydrotalcites makes them unsuitable as catalysts for many high temperature gas-phase reactions. A paper by Y. Ono *et al.* explores the utility of chloride- and methoxide-exchanged hydrotalcites as catalysts for halide exchange, a liquid phase organic reaction that takes place under mild conditions. There are also papers discussing the production of

mesoporous materials from synthetic hectorites and the optical properties of dyes incorporated into clays.

In an article reviewing some recent synthetic and structural work from his laboratory, T. Iwamoto describes the “mineralomimetic chemistry” of clay- and zeolite-like structures built of polymeric cyanocadmates. By using Cd-CN-Cd linkages, networks can be built up that are formally similar to those comprised of Si-O-Si found in minerals, but the longer span in the synthetic cadmate system results in the inclusion of guest molecules and the presence of microporosity in the structures.

The molecular design of layered zirconium phosphonate catalysts is described by K. Segawa *et al.* These materials have mineral-like inorganic zirconium phosphate layers with organic groups covalently attached to the layers and directed into the interlayer space. By varying the functional nature of the organic group and the structural composition of the interlayer region, the catalytic performance for the hydrolysis of ethyl acetate in aqueous solution was optimized.

This book presents a snapshot view of current interests in the field of microporous crystals. A good cross section is represented both in terms of subject and geography. Half the papers are from authors working at Japanese institutions, and the rest are from an international group of contributors. There are 39 contributions, totaling 384 pages. Like all volumes of conference proceedings, this book lacks the unity of theme possible in a multiauthored book dedicated to a single topic and planned accordingly. It reads much like an issue of a specialty journal. The book is set from camera-ready copy, and all the contributions are quite legible. The individual papers have been refereed and the quality is generally quite high. Many of the papers are valuable in their own right, and anyone interested in an overview of the field of microporous crystals would be well-advised to obtain a copy of this book and browse through it. However, its high price and its currency make it unlikely that the individual researcher will find it on his shelf to refer to in succeeding years.

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