

## BOOK REVIEWS

**Chemistry and Physics of Solid Surfaces VI.** Edited by R. VANSELOW AND R. HOWE. Springer-Verlag, New York, 1986. \$83.00.

Chemistry and Physics of Solid Surfaces VI is the proceedings of the 7th International Summer Institute in Surface Science (ISISS) held at the University of Wisconsin/Milwaukee in July 1985. This volume contains a collection of review articles written by established scholars in the field of surface science and catalysis. The book is dedicated to the memory of two distinguished scientists and pioneers in the field of surface science and catalysis, Professors G. M. Schwab and P. H. Emmett.

After a tribute to Professors Schwab and Emmett written by their former students J. H. Block and W. K. Hall, a review of the progress in the area of catalysis by metals is given by Sinfelt. Gates reviews recent advances in the understanding of the structure of supported metal clusters in connection with their catalytic activity. Drawing from his exhaustive studies of the molybdena-alumina system, Hall offers a methodology for investigating the surface structure and the nature of the catalytic site in supported transition metal oxide catalysts. Thomas examines the relationship between the structure of zeolites and their catalytic performance. Application of X-ray absorption techniques to the study of the structure and orientation of adsorbed species is described by Outka and Madix. The use of metal single crystals and surface analytical techniques for the study of the effect of promoters and poisons on chemisorption and catalysis is discussed by Goodman. Grunze reviews recent kinetic and thermodynamic studies of weakly chemisorbed phases. Yates *et al.* introduce a new technique, scanning kinetic spectroscopy (SKS), and explore its potential as a fast probe for surface reaction kinetics. A Raman technique capable of studying adsorbed molecules on single crystal surfaces in the absence of any surface enhancement of the Raman scattering is developed and described by Campion.

Applications of the time-of-flight atom probe field ion microscopy and field emission microscopy to the study of gas surface interaction are described by Tsong and Melmed, respectively. Behm and Höslér evaluate scanning tunneling microscopy as a technique to probe the topography and electronic structure of surfaces. The contribution of high-resolution electron microscopy to surface science is reviewed by Smith.

Himpel outlines various spectroscopic techniques that can be used to study electronic states at surfaces or interfaces. The use of spin-polarized electrons in

investigating the electronic and atomic structure of nonmagnetic and ferromagnetic materials is described by Kirschner. Fauster and Dose review the development of inverse photoemission spectroscopy as a technique for probing bonding at surfaces by monitoring the unoccupied electronic states. Tong *et al.* illustrate how various electron and photon probes can be utilized to determine the structure of surfaces.

The advantages and limitations of low-energy alkali ion scattering as a technique for surface structure analysis are discussed by Bauer and Von dem Hagen. Finally, theoretical aspects of multilayer adsorption and wetting phenomena and the use of diffraction techniques for the studies of layering and wetting transitions are discussed by Ebner *et al.*

This book continues a series of biannual updates in the area of surface science and will be a worthwhile addition to workers in this field.

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**Metal Clusters in Catalysis.** Edited by B. C. GATES, L. GUCZI, AND H. KNOZINGER. Elsevier, New York, 1986. \$84.75.

Research on metal clusters (compounds with metal-metal bonds) has undergone explosive growth in recent years and the subject is now one of considerable interest to catalytic chemists. The prospect of catalytic applications has motivated a large part of the research described in this book where the role of metal clusters in catalysis is addressed. The coverage is up-to-date and is particularly comprehensive, ranging from molecular chemistry of clusters (synthesis, structure, thermochemistry, reactivity, and homogeneous catalysis) to supported clusters (molecular analogs on polymers). The book gives a clear and comprehensive statement of the way in which catalysis and organometallic chemistry are merging, and will thus provide much to interest workers in these fields.

The contents include "Molecular Metal Clusters." Chapter 1. Synthesis of Mono- and Multimetallic Metal Clusters (G. L. Geoffroy). 2. Structures of Metal Clusters (G. L. Geoffroy). 3. Thermochemical Properties and Bond Energies of Transition Metal Clusters (J. A. Connor). 4. Reactivities of Metal Clusters (E. Lavigne and H. D. Kaesz). 5. Homogene-

ous Catalysis by Metal Clusters (L. Marko and A. Vizi-Orosz).

"Metal Clusters in and on Supports." 6. Characterization by Physical Methods (H. Knozinger, L. Guzzi, and R. F. Pettifer). 7. Dispersed Metal Clusters from Metal Vapor Chemistry (G. A. Ozin and M. P. Andrews). 8. Metal Clusters and Zeolites (P. A. Jacobs). 9. Supported Metal Catalysts Prepared from Molecular Metal Clusters: Organometallic Surface Chemistry (B. C. Gates, R. Psaro, R. Ugo, G. Maire, and H. Knozinger). 10. Supported Bimetallic Catalysts Derived from Molecular Metal Clusters (L. Guzzi).

"Relations between Molecular Clusters and Metal

Surfaces." 11. Relations between Metal Clusters and Metal Surfaces (G. Ertl).

"Summary and Evaluation" (B. C. Gates, L. Guzzi, and H. Knozinger).

This book will prove a useful addition to the library of most researchers in the field of catalysis.

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