

Chemistry and Physics of Solid Surfaces VI

Edited by R. Vanselow and R. Howe
(Springer-Verlag Series in Surface Sciences, 1986)

This volume, edited by R. Vanselow (University of Milwaukee) and R. Howe (University of Auckland, New Zealand), continues the excellent Springer Series in Surface Sciences. It is dedicated to two pioneers in catalysis, G.M. Schwab and P.H. Emmet, but the 20 review articles it contains cover a much wider range of topics in chemistry and physics of solid surfaces. The articles represent the tutorial reviews given at the Seventh International Summer Institute in Surface Science (SISS). They are written so that the novice in an area is carefully educated in understanding what has been accomplished. Both he and the expert will be delighted by the presentation of work being performed today, and in many cases, by the thoughtful analysis of where it may lead. An excellent selection of references is included with each review.

A perspective of the status of surface structure imaging tools using electrons is conveyed by the juxtaposition of reviews. The reviews show (1) the evolution, status and research use of established techniques ("High-Resolution Electron Microscopy in Surface Science" by D.J. Smith, and "Field Emission Microscopy - Trends and Perspectives" by A.J. Melmed) and (2) the potential of a new technique ("Scanning Tunneling Microscopy" by R.J. Behm) to combine imaging of physical structure with simultaneous atom-by-atom analysis of electronic structure. Indirect imaging techniques are covered in two reviews: S.Y. Tong's theoretical treatment shows how surface analytical techniques employing elastic and inelastic electron scattering are used to extract the structure of surfaces. E. Bauer gives an authoritative account of the use of low energy ion scattering spectroscopy for determining surface structure, elucidating the advantages and difficulties of using alkali rather than noble gas ions.

The electronic structure of surfaces is covered in less detail. F.J. Himpsel briefly reviews surface electronic states at the valence level and at the core level. J. Kirschner describes the use of spin-polarized electrons to study physical structure by LEED (of nonmagnetic materials), magnetic structure by secondary electron emission, and the electronic structure by photoemission. Th. Fauster shows the use of inverse photoemission spectroscopy to determine band and surface states and adsorbate states. Compositional analysis of surfaces is represented by the review of the time-of-flight atom probe by T.T. Tsong,

who also shows its use for adsorption and reaction studies. The field is well represented here by M. Grunze's treatise on the thermodynamics and kinetics in weakly chemisorbed phases, A. Campion's work on raman spectroscopy of adsorbed molecules, J.T. Yates Jr's kinetic and spectroscopic investigations of surface chemical processes, and D.A. Outka's article on structural characterization of molecules and reaction intermediates on Cu and Pt surfaces by SEXAFS and NEXAFS.

Multilayer adsorption and wetting phenomena are given a sound theoretical expose by C. Ebner. Experiments in this field, electron, x-ray and neutron diffraction studies of layering and wetting transitions are presented by L. Passel.

Catalysis itself appears in the title of four articles, beginning with J.H. Sinfelt's personal perspective of three decades of his work in metal catalysis, i.e., bifunctional catalysts, characterization of dispersed metal catalysts, hydrocarbon reaction on metals, and supported bimetallic cluster catalysts. W.K. Hall reviews catalysis by molybdena-alumina and related oxide systems, J.M. Thomas explores the relationship between structure and catalytic performance of zeolites, and D.W. Goodman emphasizes how profitable metal single-crystal studies are in developing an understanding of the mechanisms by which poisons and promoters alter catalytic performance.

No one person can give this book a critical review: nobody is an expert in all the topics covered. I find nothing to criticize. The quality is such that in the presentations close to the area of my own expertise I am impressed, and in those far from it, I am educated.

Wigbert J. Siekhaus is a staff scientist, Condensed Matter and Analytical Sciences Division, Lawrence Livermore National Laboratory. His interests are the study of gas-solid and gas-liquid reaction kinetics by modulated molecular beam spectroscopy, and the study of physical and electronic structure by scanning tunneling microscopy.

The Structure of Surfaces II

Edited by J.F. van der Veen and M.A. van Hove
(Springer-Verlag Series in Surface Sciences, 1988)

This book is a record of the Second International Conference on the Structure of Surfaces held in Amsterdam, June 22-25, 1987. The editors have done an excellent job of arranging the contributions into logical divisions: techniques, clean metals, adsorbates on metals, clean semiconductors, epitaxy, phase transitions, and defects, disorder and morphology. The contributions include a good sampling of current work in the structure of surfaces. As often occurs in conference proceedings, some of the work has been published elsewhere in slightly different form. While this practice leads to duplication in the literature and longer publication lists for the authors, it does allow such proceedings to be more self-contained.

One pleasant surprise was the use of color on p. 284 to present computer models and scanning tunneling microscopy data for the Si(111)(7x7) surface. The reproduction of this and numerous black-and-white diffraction and microscopy pictures was uniformly excellent. The use of camera-ready submissions leads to a variety of type styles, but the arrangements are generally quite readable. I would have preferred a brief abstract for each article and identification of invited presentations. I also think a photograph and list of attendees would add some extra life to such proceedings. Overall the editors are to be commended for publishing the proceedings rapidly and in a reasonable format. At the current price of \$65 (DM120), the volume should definitely be in research libraries which aim to serve surface scientists.

Reviewer: Sam Fain is professor of physics, University of Washington, Seattle, and a Fellow of the American Physical Society. He supervises graduate student research on the structure of physically adsorbed layers on solid surfaces.

E-MRS

1989 Spring Meeting

May 30–June 2, 1989 □ Strasbourg, France

For information contact E-MRS president Paul Siffert at the address listed on page 2 in this issue.