

### Microclusters

*Edited by S. Sugano, Y. Nishina, and S. Ohnishi*  
(Springer-Verlag, 1987)

*Microclusters* is a collection of papers presented at the First NEC Symposium on Fundamental Approaches to New Material Phases, held October 20-22, 1986 in Hakone and October 23, 1986 in Kawasaki, Japan. The papers have been organized into seven sections: shell model, electronic structure, new experiments, dynamical processes, structural fluctuations, larger microclusters, and semiconductor clusters. Of the 37 papers presented, 24 are from Japanese groups; however, the United States and Europe are well represented by seven and six contributions, respectively.

In a surprising departure from recent cluster meetings, 26 contributions emphasize theoretical rather than experimental treatments. These include electronic structure, geometry, and dynamics, the latter a newly emerging aspect of cluster research. The electronic structure papers describe different *ab initio* techniques and also model approaches to extract information on cohesion, bonding, and relative stability that can be compared with experimentally determined abundances. A few papers address the important problem of determining adequate potential energy surfaces, which is needed for finding equilibrium geometries and carrying out dynamical calculations.

Most of the experimental papers describe gas phase or molecular beam cluster studies. Cluster generation techniques described include ion sputtering, laser vaporization, inert gas condensation, and adiabatic nozzle expansion. Results are presented on clusters of metal and semiconductor atoms, and molecular (van der Waals) clusters. The experiments described include mass spectral determination of abundances and magic numbers, optical spectra, multiphoton ionization probes of cluster dynamics, and collisional ionization studies. A particularly intriguing paper describes structural instability of small metal particles and includes a series of dramatic high resolution electron micrographs showing the time-dependence of the structure of gold clusters deposited on SiO<sub>2</sub>-covered Si.

The study of isolated clusters of metal and semiconductor systems is a rapidly advancing field, with several major international meetings held each year. (For example, the week following the Japanese meeting, the International Symposium on the Physics and Chemistry of Small Clusters was held in Richmond, Virginia.) It is difficult for publications requiring a year's preparation to keep up with this fast pace.

Yet this is still a timely book, especially because it provides to the international audience an exposure to Japanese efforts in this area and also fairly up-to-date coverage of theoretical advances in the cluster field.

*Reviewers: S. J. Riley is group leader, and J. Jellinek is a member, of the Metal Cluster Chemistry Group, Chemistry Division, Argonne National Laboratory.*

### Glasses and Glass-Ceramics for Nuclear Waste Management

*Edited by J. Ma. Rincon*  
(Instituto de Ceramica y Vidrio, CSIC, Madrid, Spain, 1987)

This small volume, 212 pages, documents a seminar held in Madrid in May 1985 on the use of glasses and glass-ceramics as nuclear waste forms. The meeting was sponsored by Spanish research organizations (CIEMAT and CSIC) and the Hispano-USA Joint Committee for Scientific and Technical Cooperation. According to the editor, J. Ma. Rincon Lopez, this is the first book of this type published in Spain with major contributions from Spanish scientists. There are also contributions from scientists at the University of California-Davis and Lawrence Berkeley Laboratory.

The volume consists of nine contributed chapters. There are introductory chapters on the nature of high level nuclear wastes and the properties of the glassy state. Chapters on specific topics cover a wide range of subjects from heat transfer in vitri-

fied radioactive waste to the use of sodium zirconium phosphate, NZP, as a single-phase, radionuclide waste form. In general, little new material is included in these chapters. Most of the information can be found in papers which appear in the proceedings volumes of the Materials Research Society or the American Ceramic Society, often by the same authors. Two of the chapters were, however, unique. Dr. S. Martinez and co-workers presented a summary of glass ceramic materials that might be made from Spanish basalts. Dr. John Apps summarized what is known concerning the major differences in the alteration of basaltic and rhyolitic glasses. While this chapter is an interesting summary, considerable work and progress has been made on this topic since the seminar in 1985.

The volume is paperbound and consists of camera-ready copy of mixed typographical lineage. I expect this volume will only find itself on the shelves of those rare libraries which pride themselves on completeness or in the personal libraries of the contributing authors. In the absence of a preponderance of new materials, I cannot recommend this volume to scientists involved in research on nuclear waste disposal.

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