

Fine Particles Part II: Formation Mechanisms and Applications

Egon Matijević, Guest Editor

The original intention was to publish one special issue on the materials sci-

ence of fine particles. As a Guest Editor, I approached a number of specialists

with specific interests in this field, soliciting contributions. Normally, an editor expects a number of requests to be declined. In this particular instance the response was overwhelming, which indicated both the enthusiasm of the people active in fine particle science and the timeliness of the topics. Thus, the *MRS BULLETIN* decided to dedicate two issues to this subject, December 1989 and January 1990.

The December 1989 issue dealt essentially with the procedures and principles for preparing finely dispersed matter consisting of particles of different chemical composition, shape, and size. This issue treats the problems of the mechanisms of formation of well-defined dispersions and offers examples of applications in two areas—ceramics and adhesion. Only the limitations in space prevented the editor from including other topics relevant to fine particle science and technology, which are both fascinating and useful.



Egon Matijević

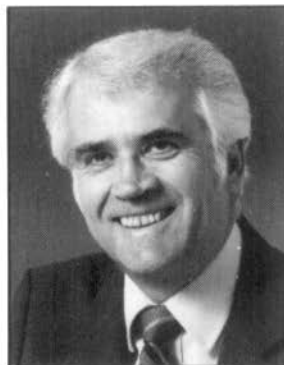
Egon Matijević, Guest Editor of this and the December 1989 issue of the *MRS BULLETIN*, is Distinguished University Professor at Clarkson University, Potsdam, New York. He received Chem. Eng., PhD, and Dr. Habil. degrees from the University of Zagreb (Yugoslavia) and the Dr. Sci. (Hon.) from Lehigh University, Bethlehem, PA. After a year at Cambridge University (England), he joined the Clarkson faculty in 1957 where he has held various administrative positions. His research interests are mostly in various areas of colloid science, including



Mark F. Buehler

stability phenomena, preparation and characterization of monodispersed colloids, soap precipitation, particle adhesion, aerosols, etc., in which he has published almost 400 papers.

His honors include the Kendall Award of the American Chemical Society, Thomas Graham Prize of the Kolloid Gesellschaft, Gold Medal of the American Electroplaters Society, foreign membership in the Yugoslav Academy of Sciences and Arts, and honorary memberships in the American Ceramic Society and the Chemical Society of Japan. He



E. James Davis

has delivered plenary lectures worldwide and is consultant to major corporations in the United States and Europe.

Mark F. Buehler is a research assistant in the Department of Chemical Engineering at the University of Washington in Seattle. He received his BS degree in chemical engineering from the University of California at Berkeley in 1984 and his MS degree in chemical engineering from the University of Washington in 1986. After working for IBM's T.J. Watson Research Center in Yorktown Heights, New York, he re-



Marc Henry

turned to Seattle in 1987 to work on his PhD. His dissertation is on single-particle Raman spectroscopy.

E. James Davis, a professor in the Department of Chemical Engineering at the University of Washington in Seattle, has been involved with the physics and chemistry of single particles for 20 years. He began this work at Clarkson University, where he was professor of chemical engineering and associate director of the Institute of Colloid and Surface Science. After working in England and teaching in other

U.S. institutions he joined the faculty of chemical engineering at the University of Washington in 1983. His current research on microparticle spectroscopy concerns gas/particle reactions associated with air pollution control, the chemical properties of macerals in coal, and the production of fine particles.

Marc Henry is a researcher with the French Research Council (CNRS). He received an engineer degree in chemistry in 1980 and a PhD in 1988 from the University of Pierre and Marie Curie (Paris) for his work on the application of the electronegativity concept to hydrolysis and condensation reactions in inorganic chemistry. His current research focuses on modeling the role of anions or organic chemical additives in the nucleation/growth/aggregation processes of oxide materials from solution using electronegativity equalization procedures. He is author of over 20 scientific publications.

Jean Pierre Jolivet is maitre de conférences at the University of Pierre and Marie Curie (Paris). He received a thèse d'état in inorganic chemistry in 1976. He has studied phosphoantimonic inorganic polymers, and around 1980 turned towards the characterization of metal colloids and then to spinel iron oxide colloids. In 1986, he joined Prof. J. Livage's group to work on sol-gel chemistry. He is currently working on the application of the partial charge model in inorganic chemistry, and is also studying the modeling of oxide-solution interface and aggregation phenomena. He is author of over 30 scientific publications.

Nikola Kallay is professor of physical chemistry with the faculty of science at the University of Zagreb, Yugoslavia, from which he received his BS, MS, and PhD degrees. His research deals with the physicochemical aspects of inter-



Jean Pierre Jolivet

faces and colloid systems, with special emphasis on the stability of colloidal suspensions, adsorption, electrical interfacial layer, dissolution kinetics, solubility of surfactant salts, adhesion phenomena, and microemulsions. Since 1980 he has been an associate member of Clarkson's Institute of Colloid and Surface Science, where he is a visiting scholar for several months each year. Kallay is active in the International Union of Pure and Applied Chemistry (IUPAC), and IUPAC has published his monograph on *Quantities, Units, and Symbols in Physical Chemistry*.

Jacques Livage, professor at the University of Pierre and Marie Curie (Paris), received an engineer degree in chemistry in 1960 and a PhD in 1966. After spending a year at Oxford, Clarendon, where he studied electron spin resonance, he returned to France to become a professor in the chemistry department at the University of Pierre and Marie Curie. He studied electron delocalization in mixed valence oxides, and around 1980 his interest turned toward vanadium pentoxide gels and their semiconducting properties. He is now head of a mixed CNRS/University laboratory "chimie de la matière condensée," where over 30 researchers are working in the sol-gel area. He is the author of about 150 scientific publications.

Terry A. Ring is professor extraordinaire in the Powder

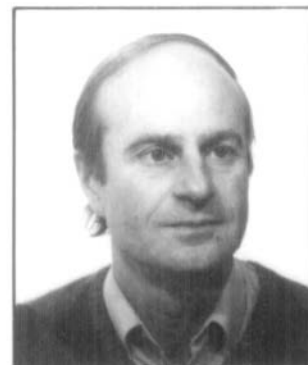


Nikola Kallay



Terry A. Ring

Technology Laboratory, Materials Science Department, at the Swiss Federal Institute of Technology in Lausanne. He has a BS in chemical engineering and an MS in physical chemistry from Clarkson College, an MS in chemical engineering from the University of California at Berkeley, and a PhD in chemical engineering from Cambridge University. He worked for Kaiser Aluminum and Chemical Company on ceramics, desiccants and Bayer precipitation and later became an assistant and associate professor in the Materials Science and Engineering Department at Massachusetts Institute of Technology, where he worked on the precipitation and processing of ceramic powders. Ring was also an associate professor of chemical engineering at the University of Utah, where he worked on precipitation and sintering of powders. He has published some 60 technical papers on powder technology and has received numerous awards including the IBM Faculty Development Award. He



Jacques Livage



Clément Sanchez

currently leads a group of 10 scientists working on the synthesis and processing of ceramic powders and sol-gel thin films for structural and functional ceramic applications.

Clément Sanchez is director of research at the French Research Council (CNRS). He received an engineer degree in chemistry from l'Ecole Nationale Supérieure de Chimie de Paris in 1978 and a thèse d'état (PhD) in physical chemistry from the University of Paris VI in 1981. He did post-doctoral work at the University of California, Berkeley, and is currently performing research at the University of Pierre and Marie Curie (Paris), specializing in the field of chemistry and physical properties of transition metal oxide gels. He received the French IBM premium for materials science in 1988 and is also member of the Materials Research Society, the Solid State Ionics Society, and the Societe Chimique de France. He is the author of over 60 scientific publications. □