APS Colloquium

Wednesday, September 4, 2002
3:00 pm
APS Auditorium, Building 402, Argonne National Laboratory
APS Colloquium home

Gabrielle Long
Materials Science and Engineering Laboratory, NIST
gabrielle.long@nist.gov
http://www.ceramics.nist.gov/

Ultra-small-angle x-ray scattering from deformed materials

When materials are deformed, their properties can change dramatically. Understanding how deformation microstructures form and evolve can be quite challenging, since some of the best characterization techniques interfere with the structures to be measured. Nevertheless, there has recently been a surge in activities related to the fundamental science of deformation as such information is key to intelligent materials processing and to improved in-service performance. New ultra-small-angle X-ray scattering (USAXS) facilities at the Advanced Photon Source offer exciting capabilities for the *in situ* observation of dislocation and other deformation microstructures, for following, for example, creep development in materials, and for observing simultaneously the secondary phases that have been added to control creep. Finally, USAXS imaging, in which high angular resolution images are acquired, can be used to observe the distribution of deformation structures on many length scales, and can occasionally even observe fatal flaws. These kinds of data are required as a guide to the development of theoretical and computational models, and as the ultimate test of their validity.

Gabrielle Long is Acting Chief of the Ceramics Division at the National Institute of Standards and Technology (NIST). She received her PhD from the Polytechnic Institute of Brooklyn (now Polytechnic University), and she served in research and teaching positions at Columbia University, Vassar College, and the State University of New York at Stony Brook before coming to the National Bureau of Standards (now NIST) in 1980. Her current research interests include microstructure characterization of ceramics, metals, nanoscale materials and plasma-sprayed coatings. She has long-standing interests in materials deformation, small-angle scattering and X-ray optics, X-ray inelastic scattering, anomalous scattering, and dynamical diffraction by imperfect (real) crystals. She is a Fellow of the American Physical Society, she was the Maria Goeppert-Mayer Distinguished Scholar at Argonne National Laboratory for 2001. She has co-authored over 100 papers and has served as lead editor of a volume on synchrotron radiation instrumentation. Since 1991, she has led the Materials Microstructural Characterization Group which designed, now operates several NIST/MSEL X-ray beam stations at the National Synchrotron Light Source, and is a partner in the UNICAT sectors at the Advanced Photon Source. She and members of her Group also maintain an active research program at the NIST Center for Neutron Research.