Brent Fultz

Professor of Materials Science and Applied Physics,
California Institute of Technology

Biography and Research

Biography. Brent Fultz received his undergraduate degree from MIT, and his Ph.D. from U.C. Berkeley in 1982. He has authored or co-authored well over 300 publications, including a graduate-level textbook on diffraction and microscopy of materials (now in its third edition). Brent Fultz was Principal Investigator for the ARCS project to construct a Fermi chopper spectrometer at the Spallation Neutron Source. He is also P.I. for the software project to develop Distributed Data Analysis for Neutron Scattering Experiments (DANSE), which is now delivering final products for neutron scattering data analysis. Awards include a Jacob Wallenberg Foundation Scholarship, Presidential Young Investigator Award, and the Distinguished Scientist/Engineer Award of TMS EMPMD for 2010.

Materials Physics. About 20 years ago, we began to sort out how the thermodynamics of solid phases are affected by differences in vibrational entropy. This led us into studies of phonon spectra by inelastic neutron scattering, which further show how the entropy of a phase depends on its atomic structure and bonding. I recently reviewed the vibrational entropy of materials [Prog. Mater. Sci. 55, 247-352 (2010), or download from the abstracts page on our group website].

Materials Chemistry. My group is studying materials that store lithium (for batteries) and hydrogen (for batteries or hydrogen fuel). Our interest is in the thermodynamics of how these materials work, such as the electronic origin of the energy and the entropy of lithiation or hydriding reactions. We also study kinetic issues that alter their stability. Neutron diffraction, quasielastic scattering, and SANS are important methods for these studies.

Candidate Statement

The major activity of the NSSA Vice President is to work with the conference organizers and professional organizations (especially the Materials Research Society) on the American Conference on Neutron Scattering. I feel ready for this responsibility, having served as an organizer of numerous workshops and symposia, and having worked to secure funding and help for them. An ACNS conference is a special meeting that blends topics over a broad range from facilities to all types of science that centers on neutrons. A challenge is prioritizing the importance of the work in these disparate topics, but the success of previous meetings show that this can be done, and we appreciate this diversity.

As individuals, we see how neutron scattering offers opportunities in our own fields of science. The NSSA can help us tell the compelling story of neutron scattering research to the public and scientists in other fields. I will try to expand the membership of the NSSA and encourage new groups of scientists to join us in neutron scattering research. Although this brings more competition to our work, more users are needed to ensure the health of the field of neutron scattering and its facilities.

At our established neutron facilities, we cannot lose sight of the need for a balanced portfolio of neutron sources, instruments, and user support. Two concerns would drive my actions in the NSSA. First, I see a real need for more working beamlines in North America. Second, I would like to see more science come out of the work done with today's instruments. Sample environments, software and user support offer efficiencies here. Funding is the challenge behind these concerns, of course. The NSSA needs to help build our community, make our voices heard, and call for the national need for neutrons.