

Carnegie Mellon

Materials Science and Engineering Seminar Series

George Crabtree

Materials Science Division
Argonne National Laboratory

“The Sustainable Energy Challenge”

Friday, September 4, 2009
10 A.M. Seminar in Baker Hall 136A

The global dependence on fossil fuels is among the greatest challenges facing our economic, social and political future. The uncertainty in the cost and supply of oil threatens the global economy and energy security, the pollution of fossil combustion threatens human health, and the emission of greenhouse gases threatens global climate. Meeting the demand for double the current global energy use in the next 50 years without damaging our economy, security, environment or climate requires finding alternative sources of energy that are clean, abundant, accessible and sustainable. The transition to greater sustainability involves tapping unused energy flows such as sunlight and wind, producing electricity without carbon emissions from clean coal and high efficiency nuclear power plants, and using energy more efficiently. Achieving these goals requires creating new materials of increasing complexity and functionality to control the transformation of energy between light, electrons and chemical bonds. Challenges and opportunities for developing the complex materials and controlling the chemical changes that enable greater sustainability will be presented.

GEORGE CRABTREE holds the ranks of Senior Scientist, Distinguished Fellow and Associate Division Director in the Materials Science Division at Argonne National Laboratory. He has won numerous awards for his research, most recently the Kammerlingh Onnes Prize in 2003 for his work on the physics of vortices in high temperature superconductors. This prestigious prize is awarded once every three years; Dr. Crabtree is its second recipient. He has won the University of Chicago Award for Distinguished Performance at Argonne twice, and the U.S. Department of Energy's Award for Outstanding Scientific Accomplishment in Solid State Physics four times, a notable accomplishment. He has an R&D 100 Award for his pioneering development of Magnetic Flux Imaging Systems. He is a Fellow of the American Physical Society, a charter member of ISI's Highly Cited Researchers in Physics, and a Member of the U.S. National Academy of Sciences.

Dr. Crabtree has served as Chairman of the Division of Condensed Matter of the American Physical Society, as a Founding Editor of the scientific journal *Physica C*, as Divisional Associate Editor of *Physical Review Letters*, as Chair of the Advisory Committee for the National Magnet Laboratory in Tallahassee, Florida, and as Editor of several review issues of *Physica C* devoted to superconductivity. He has published more than 350 papers in leading scientific journals, has collected over 14,000 career citations, and has given approximately 100 invited talks at national and international scientific conferences. His research interests include materials science, sustainable energy, nanoscale superconductors and magnets, vortex matter in superconductors, highly correlated electrons in metals. He has led workshops for the Department of Energy on hydrogen, solar energy, superconductivity, and materials under extreme environments, co-chaired the Undersecretary of Energy's assessment of DOE's Applied Energy Programs. He has testified before the U.S. Congress on the hydrogen economy and on meeting sustainable energy challenges.