Michigan State University
Science at the Edge
Engineering Seminar

October 18, 2019
11:30 a.m., Room 1400 Biomedical and Physical Sciences Building
Refreshments served at 11:15 a.m.

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CTO Alamo Creek Engineering

Mechanical Resonances Reveal Thermodynamics, Physics, and Engineering Properties of Materials

Abstract

New measurement techniques are central to the advancement of science. One emerging strategy, made possible today by the accessibility of powerful personal computers, is the development of instrumentation that requires massive computational power to produce otherwise unobtainable results. Resonant ultrasound spectroscopy (RUS) is an example. Elastic moduli are among the most fundamental attributes of a solid, connecting to physics, thermodynamics, engineering applications, metallurgy, non-destructive testing, and more. They are the very bottom of the phonon dispersion curve. They have the most symmetry content of any thermodynamic susceptibility (e.g. heat capacity doesn't have any). But they are not so easily measured accurately, especially in low-symmetry materials. We describe here the evolution and applications of RUS to science, technology, and engineering.

Bio

Albert Migliori received his B. S. in physics in 1968 from Carnegie Mellon University, his M. S. and Ph.D. in physics from the University of Illinois in 1970 and 1973. He is co-discoverer of acoustic heat engines, and is a leading expert in the use of resonant ultrasound spectroscopy as a solid-state physics tool for which he was awarded an RD100. He won in 2016 the Joseph F. Keithley award for advances in measurement sciences from the American Physical Society. He is a fellow of the Los Alamos National Laboratory, the American Physical Society, the American Association for the Advancement of Science, and the Acoustical Society of America. He was recently Chair, Physical Acoustics Technical Committee, Acoustical Society of America (PATC), and Chair, General Instrumentation and Measurement Topical Group (GIMS), American Physical Society, and was Secretary and Treasurer of the American Physical Society Topical Group on Energy (GERA). He holds 25 patents, is the author of about 200 publications, six book chapters, and one book.

For further information, please contact Prof. Alexandra Zevalkink, Department of Chemical Engineering and Materials Science at alexzev@egr.msu.edu.

Persons with disabilities have the right to request and receive reasonable accommodation. Please call the Department of Chemical Engineering and Materials Science at 355-5135 at least one day prior to the seminar; requests received after this date will be met when possible.