CSU PHYSICS COLLOQUIUM

"X-ray scattering explorations of growth, polarization switching, and domain formation in thin ferroelectric epitaxial films"

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Monday, September 26th at 4PM

120 Engineering (Hammond Auditorium)

Abstract

In situ, time-resolved techniques provide valuable insights into the complex interplay of kinetic and equilibrium mechanisms active during materials synthesis and subsequent processing. X-ray based versions are particularly well suited to penetrate chamber walls and complex reactive environments. With the brilliance and coherency of the x-ray beams at hard x-ray synchrotrons, such as at the Advanced Photon Source (APS) at Argonne National Lab, it is possible to exploit the sensitivity of surface scattering techniques used in-situ, to quantify atomic to microscale structure and its evolution within thin epitaxial films under complex environments.

In this colloquium, I will cover some of our work on thin film growth and the effects of strain and electrostatic boundary conditions on ferroelectric domain formation in lead titanate films. Epitaxial thin films of ferroelectric materials such as PbTiO3 exhibit fascinating behavior from a fundamental science perspective that underlies their outstanding properties for advanced microelectronics and micromechanical devices. Because of the strong coupling between polarization and strain, thin epitaxial films exhibit ordered nanoscale polarization domains that can be controlled by electrical and chemical boundary conditions and observed by x-ray scattering. Work supported by the U.S. Department of Energy, Office of Science, Basic Energy Sciences, Division of Materials Sciences and Engineering.

Biography

Carol Thompson is Professor in the physics department at Northern Illinois University in DeKalb, Illinois. Prior to NIU, she was on the faculty at Polytechnic University in Brooklyn, NY (currently known as the Tandon School of Engineering, New York University). She did her postdoctoral work at IBM T.J. Watson Research Labs in Yorktown Heights, NY after graduating with a Ph.D. in Physics from the University of Houston and an M.S. in Materials Science and Engineering from Stanford. She entered Caltech four years after women were first admitted into its undergraduate programs, and earned a B.S. in Engineering and Applied Science.