

COLLOQUIUM

Thermodynamics & Elasticity from Inelastic X-Ray Scattering



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Many measurable thermodynamic and elastic properties of materials partially originate from vibrations of atoms, like specific heat, entropy, free energy, velocity of sound, viscosity, thermal conductivity, Young Modulus, Debye-Waller factor, and elasticity tensor components. Akin to traditional tools like inelastic neutron scattering and Raman & Brillouin spectroscopy, x-rays are also capable in a variety of schemes to measure phonon density of states, and phonon dispersion relations. In the harmonic approximation, many of the thermodynamic properties are additive function of phonon density of states, and hence they can be derived from such measurements. The fact that these experiments can be carried out on micron size samples under extreme temperature and pressure conditions, from nanoclusters or thin layers make the inelastic x-ray scattering techniques suitable for modern materials science and mineral physics. In this presentation, I will touch upon biophysics and geophysics applications, provide examples from enzymes, proteins, and minerals..



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15⁰⁰ - 16⁰⁰



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