Identifying phase transitions and kinetics in cerium metal using resonant ultrasound spectroscopy

GUNJAN MISHRA, GUNES KAPLAN, T.J. ULRICH, KATHERINE MCCALL, Physics Dept., University of Nevada, Reno — Resonant Ultrasound Spectroscopy (RUS) is a technique which employs the information revealed by the natural modes of vibration or resonance of solids to determine elastic moduli, ultrasonic attenuation and crystalline symmetry and is sensitive both to micro and macroscopic properties of an object. Cerium in its elemental form has been of great interest to both theoretical and experimental research, especially for its polymorphic transformation between two fcc phases ($\gamma \to \alpha$), as well as an intermediate phase ($\beta$) at low pressures. In our present work the RUS technique is used to study the elastic behavior of pure Cerium metal during these phase changes as well as to understand more clearly the phase transformation behavior and transition kinetics within the temperature range of 4 – 350 K and at low pressures. Work supported by the US DOE under Grant No. DE-FC52-01NV14050 at UNR.

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Date submitted: 22 Dec 2004