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Elastic properties of polycrystalline cerium hydrides and deuterides measured using resonant ultrasound spectroscopy[1] ADITYA SHIVPRASAD, TARIK SALEH, Materials Science and Technology, Los Alamos National Laboratory, JOSEPH WERMER, Sigma Division, Los Alamos National Laboratory, ROLAND SCHULZE, Weapons Systems Engineering, Los Alamos National Laboratory, WILLIAM BUTTLER, Physics Division, Los Alamos National Laboratory
— During intense shock loading experiments of reactive materials, such as cerium, small fragments are ejected from the roughened metal surfaces. Fragments ejected into hot, reactive gases (i.e. hydrogen or deuterium) may react with the gas and break-up into smaller fragments in cases where they would be otherwise hydrodynamically stable, such as in a non-reactive gas. To study this process, it is important to have high-fidelity measurements of the mechanical properties of reaction products like cerium hydrides and deuterides. However, many reported values for these properties are not self-consistent and are limited to modeling and nano-scale mechanical testing, which requires assumptions about the mechanical behavior. In this study, massively hydrided and deuterided cerium samples were analyzed for room temperature elastic properties using resonant ultrasound spectroscopy, which provides self-consistent, bulk values for elastic moduli. Results are discussed to highlight the differences between the properties of the hydride and the deuteride, as well as to compare results with literature values.

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