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Resonant Ultrasound Spectroscopy Characterization of Annealing and Grain Growth in Copper GUNES KAPLAN, TIM DARLING, KATHERINE MCCALL, Physics Department, University of Nevada, Reno — Resonant Ultrasound Spectroscopy (RUS) is used for determining the bulk elastic properties of a solid material with known dimensions, density and shape from its characteristic vibration frequencies. RUS characterization of polycrystalline materials is based on the assumptions of material uniformity, and the existence of isotropic polycrystal-averaged moduli. The elastic properties of a polycrystalline material depend on the material's microstructure, which can be changed by heat treatment. In this present work, RUS has been applied to heat treated polycrystalline copper specimens; measurements of the resonance frequencies as a function of heat treatment were obtained and used to derive elastic constants. The elastic constants are correlated to the average grain size in the sample, determined by a visual measurement. We find that when the grain size reaches 10% of the sample dimension, elastic constant fit errors suggest that the sample is losing uniformity. We also discuss a number of measurement results that depend on details of the sample mounting and transducer placement.

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