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Elasticity as a function of grain size in polycrystalline copper
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Physics Dept., University of Nevada, Reno — The elastic behavior of high purity polycrystalline copper samples has been investigated using Resonant Ultrasound Spectroscopy (RUS) to determine the effect of grain size on bulk elastic properties. RUS measurements were performed on ten nominally identical copper samples (1 cm³, 5N purity). Standard recrystallization and heat treatment techniques were used to increase the grain size in each of the samples from μm to mm sized grains. Results of the RUS analysis can be compared to predictions of the expected elastic behavior as described by the Hall-Petch relationship. The Hall-Petch relationship is generally accepted to be applicable in determining physical properties of polycrystalline metals, however, there is some question as to its validity in the elastic regime. Work supported by the US DOE under Grant No. DE-FC52-01NV14050 at UNR.

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