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Structure-property response of gold films with controlled microstructure DANIEL HOOKS, WILLIAM ANDERSON, ANIRBAN MANDAL, GEORGE GRAY, BRIAN JENSEN, Los Alamos National Laboratory — Gold is of interest as a model system in high-pressure and dynamic research because of its high compressibility and inert character, especially because purity, defects, and grain structure can be carefully controlled. Further, because of its potential as a graded density alloy, baseline characterization is important. Gold can be prepared in several ways, leading to some different characteristics, and it is the goal of this research to characterize how these differences manifest in changes in physical properties. Characterizing the relationships between film thickness, grain size, and grain aspect ratio together is important in resolving the relative influences of scale, bulk material properties, and defect contributions to properties. We present a study of electroplated films of gold with tailored microstructures up to thicknesses of several mm, in which we relate the grain structure to mechanical response. Constant potential and pulsed plating techniques were used to create a variety of grain structures, including high aspect ratio columnar grains. These structures were compared to cast and wrought microstructures. Microscopy was correlated with mechanical characterization of the films at several rates and scales. This work is connected to impact experiments on these materials, presented elsewhere in this meeting.

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