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Resistivity induced by electron-grain boundary scattering on thin gold films deposited on mica substrates under high vacuum RAUL C. MUNOZ, RICARDO HENRIQUEZ, PABLO LEIVA, SIMON OYARZUN, MARCO A. SUAREZ, PAULA MANRIQUEZ, SIMON SILVA, GERMAN KREMER, LUIS MORAGA, Department of Physics, University of Chile — We report measurements of the room temperature resistivity and of the grain size distribution on a family of gold films deposited onto mica substrates under high vacuum. The films are of the same thickness (100 nm ± 10%), deposited at the same rate (3 nm/min), varying both the temperature of the substrate and the annealing temperature (if any) between –170 °C and +270 °C. The grain distribution was measured with a Scanning Tunneling Microscope. The average grain size decreases from approximately 200 nm to a few nm, when the temperature of the substrate decreases from +270 °C to –170 °C during evaporation. The monotonic decrease in grain size leads to a monotonic increase in resistivity of almost one order of magnitude. The resistivity of the film evaporated with the substrate held at +270 °C and annealed for one hour at +270 °C after evaporation, exhibits a room temperature resistivity only a few percent larger than crystalline gold. Research funded by FONDECYT 1040723.

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