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Electron-phonon relaxation in weakly disordered AuPd wires due to inelastic scattering from defects JUHN-JONG LIN, National Chiao Tung University, YUAN-LIANG ZHONG, Chung Yuan Christian University, CHII-DONG CHEN, Academia Sinica, ANDREI SERGEEV, University at Buffalo —
To identify and investigate mechanisms of the electron-phonon relaxation in weakly disordered metallic conductors, we study the relaxation in a series of suspended and supported 15-nm thick AuPd wires. In a wide temperature range, from 8 K up to above 20 K, the measured relaxation rate reveals quadratic temperature dependence. Our observations are shown to be in agreement with the theory, which predicts that inelastic electron scattering from vibrating impurities and defects strongly dominates over ordinary electron-phonon interaction even in weakly disordered metallic conductors. Due to inelastic electron-boundary scattering this mechanism plays a leading role in the electron relaxation in nanosctructures with metallic components.

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