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Optical pump wavelength dependence in visible-pump visible-probe spectroscopy of noble metals DEREK G. SAHOTA, Department of Physics, Simon Fraser University, CALVIN LOBO, Department of Physics, McMaster University, KONRAD DUCH, Faculty of Mathematics, University of Waterloo, J. STEVEN DODGE, Department of Physics, Simon Fraser University — We have developed a femtosecond visible-pump visible-probe reflectometer with individually tunable pump and probe photon energies. The spectrometer has been used to study optically thick films of the noble metals Au and Cu over a wide variety of pump fluences and photon energies. Through comparison between experimental measurements and two-temperature model (TTM) simulations, we estimate an electron-phonon coupling constant, g, of $2.37 \pm 0.11 \times 10^{16}$ $\mathrm{Wm^{-3}K^{-1}}$ for Au and $1.19 \pm 0.13 \times 10^{17}$ $\mathrm{Wm^{-3}K^{-1}}$ for Cu, consistent with previous studies. The variation of the optical pump parameters allows a more accurate determination of the electron-phonon coupling constant. The relaxation rate, τ, of the thermally excited electrons is shown to be strongly dependent on the peak electron temperature of the excited sample, and only weakly dependent on the pump photon energy. The static dielectric constant is found to significantly underestimate the dependence of the differential reflectivity on the pump photon energy.

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