

Ultrafast non-linear optical and electronic dynamics in transition metals: superplasmonic states and hot electrons for advanced applications

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Over the past 10 years the authors explored ultrafast linear and nonlinear optical and electronic dynamics in strongly electronically-excited transition metals [1-6], including the common plasmonic noble metals. Pump/probe reflectometry and electrical collector techniques were applied to reveal concerted prompt saturation of inter-band absorption and band-filling [1, 2], accompanied by free-electron heating and emission. Ultrafast broadband in situ transmission spectroscopy supported these findings for ultrafast non-linear photoexcitation in noble metals, demonstrating prompt blue-shifting of localized plasmon resonance in colloidal nanoparticles.

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