FEMTOOPTICS OF FILMS AND NANOPARTICLES OF NOBLE METALS

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S u m m a r y

This review outlines the mechanisms of heating and cooling of the electron gas in nanoparticles and film structures of noble metals (Cu, Ag, Au) under the action of femtosecond laser pulses of "various" intensities: "undercritical" "critical", and "overcritical". Attention is paid to the following basic issues: i) influence of the medium size and the dimensionality on dynamical electron processes (electron-electron, electron-phonon, and electron-surface scattering); ii) manifestations of specific decay mechanisms of coherent electron excitations in nanoparticles associated with the generation of "breathing" modes and the collision-free Landau decay; iii) role of surface plasmons in the transformation of nanoparticles' optical properties and in the effects of local field enhancement; iv) giant nonlinear optical response of noble-metal-nanoparticles-based composites; v) specific features of the manifestation of the Lindemann threshold and the melting kinetics of film structures irradiated by femtosecond light pulses; vi) "Coulomb's explosion" of nanoparticles; vii) basic properties of a new physical object "nanoplasma"; viii) nature of the generation of ultra-high (including X-ray band) overtones in the nanoplasma of noble metals, *etc.*