

Physical effects in 2-photons photo-reduction of gold precursors.

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We report about the analysis of some relevant physical phenomena occurring during Two-Photon Photo-Reduction (TPPR) of tetrachloroauric acid (HAuCl₄), the most commonly used gold precursor. Basically, a small droplet of a diluted solution of HAuCl₄ is deposited on a glass substrate, and a femto-second pulsed NIR laser is tightly focused at the glass interface. The photo-reduction and the consequent creation of GNPs occur inside the region where the two-photon absorption threshold is reached. The key role of thermal, convective and diffusive effects on different timescales has been demonstrated by a series of experiments. In particular, thermal effects are responsible for the onset of disruptive micro-explosions occurring at each single laser shot. An experimental mapping of the temperature at the sub-micro scale is also reported.