

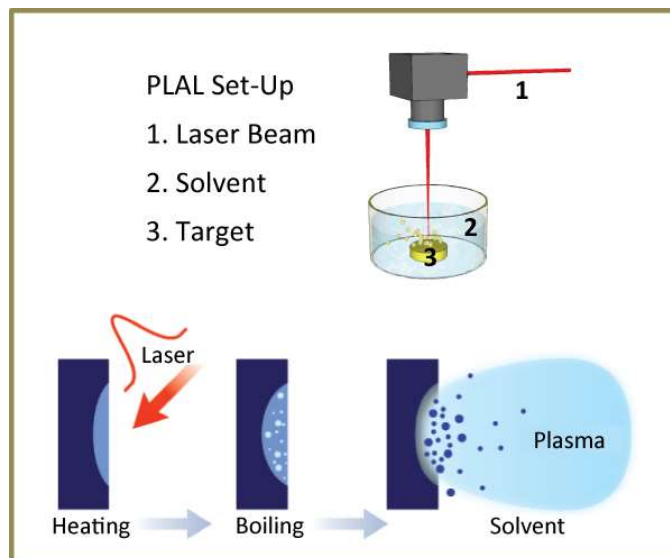
Pure, Stable i-colloid Production by Pulsed-Laser Ablation

i-colloid production by pulsed-laser ablation

i-colloid is produced by pulsed-laser ablation in liquid (PLAL), a top-down fabrication method in which a bulk target such as gold is fragmented directly in a solvent by high power laser pulses. A general schematic of the PLAL setup is shown.

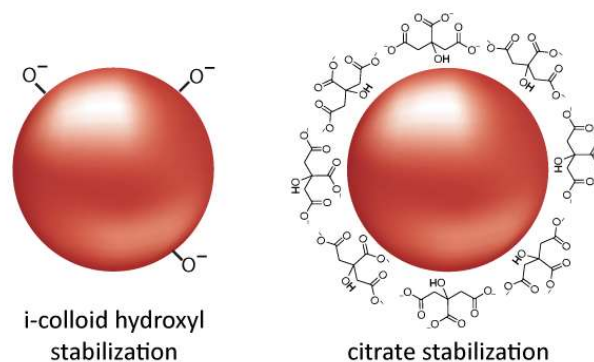
During PLAL a focused laser beam produces intense transient heat and pressure within the target material at the focal spot. As the material heats and breaks down (boils), nanoparticles mixed with low density ionized vapor (plasma) are expelled into the solvent, resulting in a colloidal solution.

Varying the target and laser conditions allows the production of nanoparticles with different compositions, features, and sizes, and IMRA has developed patented processes for manufacturing diverse families of colloids.



Stability without capping agents or surfactants

i-colloid noble metal nanoparticle surfaces are slightly oxidized at ~1% coverage during PLAL, and hydroxyl groups (OH⁻) in the solvent attach to the oxidation sites, electrically charging the surfaces and stabilizing the colloids without the need for capping agents or surfactants, such as citrate which is commonly used to stabilize chemically synthesized nanoparticles. Antibodies and other ligands can bind with high efficiency directly to i-colloid surfaces without citrate displacement.



High i-colloid Purity

The pulsed-laser ablation process results in pure i-colloid products devoid of residual contaminants that can be present in chemically-synthesized colloidal preparations that require chemical precursors, reducing agents, and stabilizers.

The higher elemental purity of i-colloid gold compared to two commercial chemically-synthesized gold colloids is shown.

