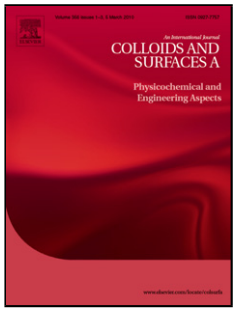

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Exceptionally stable silver nanoparticles synthesized by laser ablation in alcoholic organic solvent

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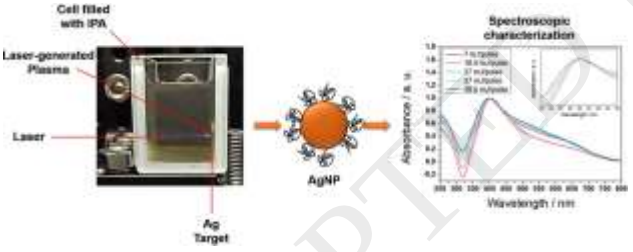
Graphical Abstract



Abstract: Silver nanoparticles synthesized using laser ablation synthesis in isopropanol, in absence of additional capping agents, were found to be stable with respect to both aggregation and silver oxidation over several months. The rationale for this extreme stability of metal nanoparticles suspended in organic solvents was challenging. On the basis of theoretical considerations and basic experiments it is proposed that the stabilization of silver nanoparticles involves the formation of an organic coating generated by the interaction of isopropanol molecules with the pulsed, high-energy laser beam. This coating prevents, on the one hand, any chemical reaction on colloidal nanoparticles (e.g. silver oxidation); on the other hand, the presence of the organic shell with a nature akin to that of the organic solvent led to weaker Van der Walls interactions between approaching nanoparticles enabling a larger stability than for naked metallic nanoparticles.