MICROWAVE ASSISTED SOLVENT-FREE SYNTHESIS OF Au, Ag and Au-Ag ALLOY NANOPARTICLES VIA GREEN CHEMICAL SYNTHETIC ROUTE

SUMMARY OF FINDINGS

Self-assembly of nanoparticles in to condensed structures is important in both theoretical and application perspective. Herein we report a simple, solid-state approach to fabricate Au, Ag and Au-Ag alloy nanoparticles of different sizes and shapes by a one-step microwave thermal explosion of corresponding metal precursor/Glucose pasty mass. The formation and morphology of metal nanoparticles were characterized by UV-Vis absorption spectroscopy, scanning electron microscopy and transmission electron microscopy. Size selective speciation of smaller particles from larger ones is successfully achieved when the colloidal dispersion is injected into a mixture of 1-Decane thiol dispersed in ethanol. Very small nanoparticles with sub 5 nm sizes underwent a phase transfer to 1-decanethiol rich region, while the larger particles remained at the ethanol-1-decanethiol interface. Drying induced self-assembly of these smaller particles results into 2D superlattice structures due to interdigitation of alkyl groups of 1-decanethiol molecules with excellent monodispersity having average particle core diameter 4.52 nm. Drying induced self-assembly also leads to ring structures, probably due to the radial movement of small individual particles.