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Thermally Stable Gold Nanoparticles with a Crosslinked Diblock Copolymer Shell SE GYU JANG, ANZAR KHAN, CRAIG J. HAWKER, EDWARD J. KRAMER, UCSB — The use of polymer-coated Au nanoparticles prepared using oligomeric- or polymeric-ligands tethered by Au-S bonds for incorporation into block copolymer templates under thermal processing has been limited due to dissociation of the Au-S bond at T $>$ 100°C where compromises their colloidal stability. We report a simple route to prepare sub-5nm gold nanoparticles with a thermally stable polymeric shell. An end-functional thiol ligand consisting of poly(styrene-b-1,2&3,4-isoprene-SH) is synthesized by anionic polymerization. After a standard thiol ligand synthesis of Au nanoparticles, the inner PI block is cross-linked through reaction with 1,1,3,3-tetramethyldisiloxane. Gold nanoparticles with the cross-linked shell are stable in organic solvents at 160°C as well as in block copolymer films of PS-b-P2VP annealed in vacuum at 170°C for several days. These nanoparticles can be designed to strongly segregate to the PS-P2VP interface resulting in very large Au nanoparticle volume fractions ϕ_p without macrophase separation as well as transitions between lamellar and bicontinuous morphologies as ϕ_p increases.

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