

Role of Grafted Chains for the in-situ Formation of Ag Nanoparticles within Poly (epichlorohydrin)-*g*-Polymethacrylate Films

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Two kinds of amphiphilic comb-like copolymers, i.e. poly (epichlorohydrine)-*g*-poly (methylmethacrylate) (PECH-*g*-PMMA) and poly (epichlorohydrine)-*g*-poly (butyl methacrylate) (PECH-*g*-PBMA) were synthesized using atom transfer radical polymerization (ATRP). Nuclear magnetic resonance (¹H NMR) and FT-IR spectroscopy presented the successful graft copolymerization by directly initiating the chlorine atoms of PECH macroinitiator. The amphiphilic comb-like copolymers were used as a template film for the in-situ growth of silver nanoparticles from AgCF₃SO₃ precursor using NaBH₄. UV-visible spectroscopy and transmission electron microscopy (TEM) images clearly indicated that 1) Ag nanoparticles were selectively confined in the comb-like polymer films persisting microphase-separated morphology and 2) Ag nanoparticles (4 - 7 nm) formed in PECH-*g*-PBMA were smaller than those in PECH-*g*-PMMA (6 - 11 nm). This represents that the longer hydrophobic side chains in a comb-like copolymer is more effective in controlling the formation of metal nano particles.