

## **128f Controlling Self-Assembly of Gold Nanoparticles in Block Copolymer Templates**

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Self assembly of inorganic nanoparticles within a block copolymer offers a way to produce materials with unique optical, electronic and magnetic properties. To reveal some of the fundamentals of the self assembly we have investigated the system consisting of symmetric polystyrene-poly(2-vinylpyridine) (PS-P2VP) whose total molecular weight ( $M_n$ ) is 197 kg/mol and polymer-coated gold nanoparticles. Gold nanoparticles are stabilized by carrying out their synthesis in mixtures of thiol terminated PS (PS-SH) and P2VP (P2VP-SH) chains whose  $M_n$  are 1.3 kg/mol and 1.5 kg/mol, respectively. The surface of these particles is tailored by changing the ratio of PS-SH to P2VP-SH on their surface. While PS coated gold nanoparticles are observed to locate near the center of PS domain, gold nanoparticles coated with a 1:1 mol ratio of PS-SH to P2VP-SH are segregated at the intermaterial dividing surface (IMDS) of PS-P2VP. The particle location (the center of PS domain, the IMDS of PS-P2VP chains, or the center of P2VP domain) depends on the ratio of PS to P2VP on the gold surface. The range of ratios of the PS to P2VP where gold particles segregate to the IMDS is extremely broad. For example, gold nanoparticles whose surface fraction coverage by P2VP is only 10% still segregate to the IMDS. These phenomena raise interesting questions about the spatial distribution of PS and P2VP on the gold surface. We will investigate the question by comparing the result for gold nanoparticles coated by mixtures of PS and P2VP with those coated by PS-r-P2VP random copolymers synthesized by controlled radical polymerization.