

Selective Growth of TiO₂ Shell on Dimpled Polymer Particles

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Through typical sol-gel reaction, TiO₂ shell could be formed on hydrophilic polymer microspheres, which were coated with PVP as stabilizer. We have prepared dimpled particles by temperature-controlled swelling and de-swelling method, in which decane can swell polystyrene beads by heating but then phase were separated forming snowman-like structure when cooled down. During swelling and de-swelling process, surfactant stabilizer were trapped at surface of polymer beads except dimples, which made hydrophobic on dimple area upon the evaporation of decane oil. The dimple shape or size were determined by the amount of oil captured in particles and the interfacial tension between three phases; polystyrene (PS), decane, and the suspending medium. When free or physically adsorbed surfactants were removed from the swollen particles, when titania tetraisoproxide (precursors) were hydrolyzed and condensed, titania shell were grown only at the spherical surface of particles except dimples, which produced anisotropic core-shell hybrid particles