

Surface modification of silica nanoparticles using phenyl trimethoxysilane and their dispersion stability in N-methyl-2-pyrrolidone

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Surface modified silica nanoparticles were prepared through a two-step sol-gel process. The introduction of phenyl group onto the surface of silica nanoparticles could be processed by varying the amounts of NH_4OH and phenyltrimethoxysilane (PTMS) and molar ratio of $\text{H}_2\text{O}/\text{Si}$ during the second step. Under the optimized condition, the surface properties of silica nanoparticles were completely different before and after surface modification, silanol groups being substituted by phenyl groups. The qualitative analysis of modified silica was conducted with Fourier transform infrared spectroscopy (FTIR). The degree of surface modification at the silica nanoparticles was examined based on the surface hydrophilic/hydrophobic moiety through the measurement of contact angle, surface charge by zeta-potential in aqueous solution and morphology by SEM. The mechanism of surface modification was inferred from a surface roughness. Finally when the silica was dispersed in N-methyl-2-pyrrolidone (NMP) as organic solvent, the modified silica with high concentration (20%) was better in dispersion ability.

Biography:

Professor Seong-Geun Oh got BS from Hanyang University, MS from KAIST and Ph.D from University of Florida. He has taught at Chemical Engineering Department, Hanyang University since 1997. His main research area is the preparation of nanomaterials in surfactant solution and their applications for solar cell, electronics and cosmetics.