Controlling hydrophobicity of submicrometer silica spheres via surface modification for nanocomposite applications

Zhijian Wu[1,2], 한 혁[1], 한우주[3], 김범상[4], 안경현[3], 이강택[1,*]
[1]연세대학교;
[2]Qinghai Institute of Salt Lakes, Chinese Academy of Sciences;
[3]서울대학교; [4]홍익대학교
(ktlee@yonsei.ac.kr*)

We control the hydrophobicity of submicrometer silica spheres by modifying their surface with $-CH_3$, $-CH=CH_2$, $-(CH_2)_2CH_3$, $-CH_2(CH_2)_4CH_2-$, $-C_6H_5$, $-(CH_2)_7CH_3$, and $-(CH_2)_{11}CH_3$ groups through a modified one-step process. The scanning electron microscopy (SEM), quasi-elastic light scattering (QELS), UV-visible spectra, nitrogen sorption, and water vapor adsorption methods are used to characterize the particles. Compared with the unmodified particles, the modified particles have lower water vapor adsorption because of the improved hydrophobicity of the particle surface. As a potential application, we prepare polystyrene/SiO2 nanocomposites by blending polystyrene with the synthesized particles. The water contact angle measurements show that the surface of the composite prepared with the modified particles are more hydrophobic. These comprehensive experimental results demonstrate that the hydrophobicity of the particles can be easily controlled by surface modification.