

Fabrication of Thin Shell TiO₂ Hollow spheres Using Electrolyte Glue for Energy Efficient Window Applications

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Most energy in increasing room temperature of buildings is passing through windows. In order to shield this undesirable energy input to building systems, especially for the summer, thin film coated glasses to minimize near-infrared (NIR) transmittance attract great attention as a window material. The coated glass for NIR reflectance was first developed by M. Menning using a dip coating method with stacking up TiO₂ and SiO₂ layers. The film thickness can be an important factor to achieve high reflectance at targeted wavelength region. In this study, thin shell layer hollow spheres fabricated with TiO₂ nanoparticles were designed by using an “electrolyte glue” concept. The electrolyte glue causes a viscosity increase or flocculation without change of experimental conditions, and thus it leads to reduced repulsion between TiO₂ nanoparticles with an interference effect in the electric double layer (EDL). This electrolyte effect can be interpreted with a point of ionic charges in a particle suspension solution.