

Fabrication of UV-Blocking and Transparent Optical Thin Films Using Light Scattering of TiO<sub>2</sub>/PMMA Hybrid Nanoparticles

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In order to simultaneously achieve high visible light transparency and improve the ultraviolet (UV) blocking performance of the display, inorganic-organic hybrid nanoparticles containing TiO<sub>2</sub> as the core and poly(methyl methacrylate) (PMMA) as the shell were manufactured. The inorganic TiO<sub>2</sub> nanocore with high refractive properties selectively scatters UV light, and can provide improved UV blocking properties to the adhesive film due to the difference in refractive index between the PMMA matrices. In addition, organic PMMA nanoshells prevented agglomeration between particles, maintaining high visible light transmittance of the OCA film. In order to investigate the effect of the size of TiO<sub>2</sub> nanocore on the optical properties of the adhesive film, OCA films embedded with hybrid nanoparticles of various particle sizes were prepared using a roll-to-roll process. It has been experimentally found that the adhesive film containing small TiO<sub>2</sub>/PMMA hybrid nanoparticles in an extremely low content has improved UV blocking properties and increased visible light transmittance compared to the case using only TiO<sub>2</sub> nanoparticles.