

Synthesis of hydrophobic zirconia nanoparticles and their application in organic-inorganic nanocomposites for highly refractive films

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Organic-inorganic hybrid nanocomposite materials have been studied in recent years, with the expectation that nanocomposite materials will achieve properties for optical films. Organic material has high transparency but it has limited refractive index, on the other hand inorganic material has high refractive index, thermal stability, chemical inertness, but it cannot use coating material. Because inorganic materials ZrO_2 and TiO_2 are easily aggregated in organic materials like solvent, monomer and binder, causing different surface property. So to enhance dispersibility of the inorganic materials, it should change the surface property to hydrophobic.

In this study, zirconia nanoparticles are prepared from zirconium n-propoxide, benzyl alcohol, and then modified with silane coupling agent before disperse using milling system with dispersant. The zirconia particles consisted of intrinsic ZrO_2 crystallite with 5-10 nm sizes. The modified zirconia particles show good chemical bonding between ZrO_2 and silane coupling agents so, dispersion property improved. The refractive index for sample containing modified zirconia shows high refractive index before modified sample.