

1D anisotropically assembled $ZrO_2@SiO_2$ core-shell nanostructures with tunable refractive index

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Fillers are solid additives added to different materials, especially polymer for betterment of desired properties of the original materials. Poor dispersibility of ZrO_2 nanoparticles in organic solvent presents a considerable drawback for the usage of functional composite structures, therefore, the surface of ZrO_2 needs to be modified in order to increase the compatibility with the matrix. However, surface functionalization of ZrO_2 may lead to aggregation or binding. So, we will mainly discuss about the syntheses of the inorganic fillers core-shell $ZrO_2@SiO_2$ nanoparticles. We successfully synthesized different core-shell nanostructures of $ZrO_2@SiO_2$: anisotropically 1D aligned structure, 2D sheet-aligned structure, 3D sphere-aligned structures. 1D aligned $ZrO_2@SiO_2$ nanoparticles forms well interconnected structure. The core-shell structure will be used for fine tuning the refractive index compared to the original oxides.