

Nano Silica-reinforced Elastomers for 3D Printing Materials

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Photopolymer-based 3D printing technique has attracted much attention due to its ability of fabricating tailor-made structures with high resolution. To incorporate photopolymer-based 3D printing materials with exceptional property such as enhanced mechanical property and thermal stability, inorganic particle-incorporated photo-curable composite has been developed. In this study, to enhance the mechanical property of photo-curable elastomer, nano-silica particles were introduced. A series of silica particles were synthesized using the stöber method and formulated with photo-curable polymers that functionalized through introducing acrylate group at the end of oligomer chain. Fourier transform infrared spectroscopy (FTIR) were used to verify the presence of acrylate group. Photo-curing behavior of silica reinforced polymer composites was monitored by photo-DSC. Furthermore, the tensile strength and elongation measurement were performed to reveal the effect of silica fillers on the mechanical properties of 3D-printed structures. Then, the fabrication of 3D structure was carried out by using digital light processing (DLP) printer.