

Properties of UV-curable polyester-acrylate nanocomposites with trialkoxysilane modified silica nanoparticles

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UV-radiation curing has found a broad range of commercial applications because it meets several industrial demands, such as high-speed process and reduction of the volatile organic content(VOC) of solvent. On the other hand, to improve physical properties of UV-cured coatings or films, silica nanoparticles have been used. However, silica nanoparticles possess an excess of -OH groups on their surfaces, making them hydrophilic and aggregative. But, the incompatibility of inorganic fillers and organic polymers can be avoided by surface modification of nanoparticles using trialkoxysilanes like methacryloxypropyl trimethoxysilane and vinyltrimethoxy silane. Thus, in this study, UV-curing behavior of polyester-acrylate nanocomposites with pristine and modified silica nanoparticles was investigated by FTIR spectroscopy. The physical properties of the nanocomposites were examined by universal testing machine, thermogravimetric analysis, and UV-visible spectroscopy. The structures of the nanocomposites were investigated by optical and transmission electron microscopy.