

Physical properties of UV-curable polyester-acrylate nanocomposites with organically modified silica nanoparticles

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To improve physical properties and scratch resistance of UV-cured coatings or films, silica nanoparticles are introduced to resin systems. However, the low level of compatibility results from the poor interaction between hydrophilic silica nanoparticles and hydrophobic resins. Thus, in order to enhance the compatibility silane coupling agents such as trialkoxysilanes are added. In this study, UV-curable polyester-acrylate resin systems were prepared using two different silica nanoparticles. The modification of the silica nanoparticles was accomplished by methacryloxypropyltrimethoxysilane and confirmed by multinuclear FTIR and NMR. UV-curing behavior of polyester-acrylate nanocomposites with pristine and modified silica nanoparticles was investigated by FTIR. The conversion of the nanocomposite system decreased with increasing the amount of silane-modified silica nanoparticles. The physical properties and scratch resistance of the resin system were improved by introducing the modified silica nanoparticles.