Kinetics of Urethane Acrylate Oligomer/Epoxide Hybrid Photopolymerizations

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Abstract: Hybrid photopolymerizations were conducted to characterize and compare the kinetics of urethane acrylate (ALUA) oligomers/cycloaliphatic epoxides hybrid systems. Various compositions of two different reactive systems were compared to see how they are affected by the viscosity of the formulations and the choice of dual-initiator system against atmospheric factors such as oxygen and water. Raman spectroscopy was used for *in-situ* monitoring of the hybrid systems in real time, thereby obtaining the polymerization rate and conversion for the respective hybrid systems. The viscosity of the hybrid system increases as the portion of ALUA oligomers increase by volume ratio. The conversion of epoxide rings was significantly restricted by the increase of the viscosity of the reaction system. The acrylate functionality was converted completely in the early stage of the reaction due to the plasticization effect of small molecular weight epoxides.