DIFFUSION OF COMPONENTS OF A SILANE ADHESION-PROMOTING MIXTURE INTO POLY(METHYL METHACRYLATE) STUDIED BY SUM FREQUENCY GENERATION VIBRATIONAL SPECTROSCOPY

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Sum frequency generation (SFG) vibrational spectroscopy has been used to study the buried interfaces between the polymers deuterated polystyrene (d-PS) and deuterated poly(methyl methacrylate) (d-PMMA) and a silane adhesion-promoting mixture (SAPM) consisting of (3-glycidoxypropyl)trimethoxysilane (γ-GPS) and a methylvinylsiloxanol (MVS). Due to the dissolution of d-PS SFG signal was not detected from the d-PS/ γ-GPS interface and the SFG signal collected from the d-PS/SAPM interface disappeared with time. It was also found that γ-GPS diffused through the d-PMMA film, as shown by studies of the interface between γ-GPS and a d-PMMA/PS two-polymer layer system. The PS signal was initially detected, but lost over time after the γ-GPS diffused through the d-PMMA film and dissolved the PS. Similar experiments were carried out at the interface between the SAPM and the d-PMMA/PS two-polymer layer system and it was found that there was a longer diffusion time for the γ-GPS in the SAPM through the d-PMMA layer. These results differed from those of previous SFG studies on the interface between the same SAPM and the polymer poly(ethylene terephthalate) (PET), and are consistent with solubility parameter differences for these systems.