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Structural Effects on the Interfacial Strength of Silane Coupling Agent Layers SHIGEO NAKAMURA, ELIZABETH PAVLOVIC, EDWARD KRAMER, University of California Santa Barbara — The structural effects of silane coupling agent layers on crack growth along a model interface between the natural oxide of [100]Si and an epoxy-hardener mixture consisting of the diglycidyl ether of bisphenol A(DGEBA) and triethylenetetramine (TETA) have been investigated. Previous experiments where (3-glycidoxypropyl)trimethoxysilane (GPS) was the coupling agent revealed network structures that were only loosely cross-linked in the center of the layers. The penetration of epoxy into this swellable layer produced a relatively high fracture energy (Gc) and a threshold energy release rate (Gth), immersed in water, that decreased only modestly between 20 and 80 degrees C. Here we compared these results with Gc and Gth from 10nm thick layers of (3-aminopropyl)trimethoxysilane (APS) and APS combined with [3-(Phenylamino)propyl]trimethoxysilane (PAPS) obtained by spin casting the silane coupling agent solutions composed of 90wt% ethanol and 10wt% water on the silicon oxide interface. These layers, which are closer to those used in typical industrial applications, were characterized by FT-IR, scanning force microscopy and X-ray reflection experiments.

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