A New Method for Monitoring Cure and Mobility in Epoxy Matrix and Fiber/Epoxy Interphases

Final Report

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)
The objective of this contract was to develop a new method based on reactive labeling technique for monitoring cure and mobility in epoxy matrix and fiber/epoxy interphases. These reactive labels were chosen to exhibit spectral changes in the region of UV-visible and fluorescence spectra where the polymerizing matrix has little absorption or emission. In this method, we take advantage of the magnified effects of the substituent changes in the para and para-positions of conjugated aromatic reactive labels on the UV-visible and fluorescence spectra. We have applied this method to characterize the kinetics and mechanisms of the cure in epoxy networks and in polyurethanes, the imidization process in polyimides, and the acylation in polyamides.

One particular advantage of this method is that we can often distinguish between several cure species in some polymers. This advantage makes it possible to follow cure composition throughout the cure process and to analyze the kinetics and the mechanisms of several consecutive polymerization steps in some polymers.

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A U.S. patent (No. 4,714,674) has been granted in Jan., 1988 for monitoring cure in epoxy networks. Another U.S. patent to cover applications in polyimides and polyurethanes is pending. The following is a list of publications and student theses completed during the period of the contract.

(A) Student Thesis


(B) Publications