Interfacial Energy Control of Epoxy/Urethane Acrylate Blends for Self-stratifying Structure

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Self-stratifying structures form a simultaneous complex multi-layer or gradient morphology on any solid surface after one step deposition. Self-stratifying coatings provide major advantages including economic benefits such as a improvement of manufacturing time and reduction of energy consumption. In this study, we developed self-stratified coating system bases on two kinds of polymer blends through interfacial energy control. We chose a epoxy resin and urethane acrylate as the two phase materials for forming self-stratified structures. A homogeneous mixture of two polymers with different surface free energies dissolved in a common co-solvent, and then as-prepared solution was coated on the glass slides using wire-bar. As a result, the urethane acrylate with low surface energy and the epoxy resin with high surface energy concentrate near the top layer and the bottom layer of coated surface, respectively. And also the acrylates can provide better anti-scratch and mechanical durability. The epoxy resin can provide excellent adhesion to the substrate. These self-stratified coatings can be used as surface protection coatings for automobiles, and electronics.