UNH Materials Science Seminar

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Kingsbury Hall N343
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Self-Stratifying Coatings

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Coatings in the automotive industry are complex multilayer systems consisting of various coating materials, presenting a number of challenges. Automotive coatings must have excellent resistance to chemical and mechanical erosion, in order to prolong the 'well-appearance' of the vehicle. Each coating has a specialized purpose; however, the practice of multiple coating processes adds considerable cost to the automotive body, and other drawbacks like poor interfacial adhesion and duration of the application process. Efforts offering various solutions are underway to introduce new coating formulations and application technologies to automotive coatings.

Our study primarily deals with the development of self-stratified/gradient two-phase coating systems for the automotive industry. Successful self-stratifying coatings offer two major advantages. First, there are the economic benefits of applying two coats in one operation. Second, the bonding between the two layers of the coating is much stronger than the one between separately applied coats. Consequently, there is a lower risk of inter-coat adhesion failure.

Designing a polymeric coating system for use in a specific application requires the utilization of the theoretical, as well as the practical concepts of polymer chemistry. The first part of my research focuses on synthesizing and evaluating a series of acrylate-based surface-active copolymers (phase A), and inorganic modified epoxide derivatives (phase B), which would function as topcoat and primer coat respectively. The second part investigates the driving forces that transform a quasi-stable homogeneous mixture of two-phase coatings into a stratified coating system.

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