



Non-Confidential Description

Novel Thermoset Siloxane-Urethane Fouling Release Coatings

Technology Case: RFT-197

Invention Summary

The adherence of organisms to surfaces exposed to aquatic environments (fouling) is a major economic concern, particularly in the maritime shipping industry. Fouling on ships can increase fuel consumption by up to 40%. Coatings that prevent fouling currently exist but are an environmental concern due to their release of toxic levels of tin and copper.

Scientists at NDSU have invented a novel non-toxic, cross-linked thermoset polysiloxane-polyurethane coating that exhibits properties as foul release (FR) coating and allows organisms to be sloughed off by shear forces obtained at a ship's cruising speed. In addition to exhibiting its fouling release behavior, these coatings have been demonstrated to provide improved durability to its coating surface.

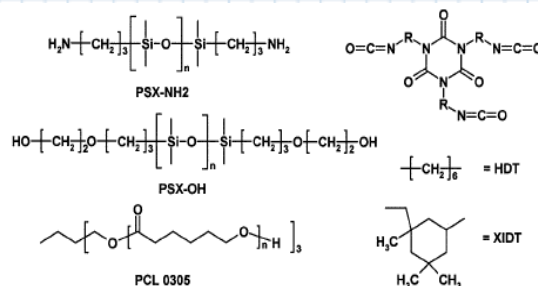


Fig. Structures of the reactants used in the coatings.

Invention Premise

The exploration of numerous variables involved in the design of novel crosslinked siloxane-urethane coatings was carried out using combinatorial methods. Libraries of coatings that explored the effect of siloxane level, solvent, and their variables were prepared and characterized for their surface energy and pseudobarnacle pull-off adhesion. Stability of the coatings was determined by measuring the surface energy after aging the coatings in water and re-measuring the surface energy. Coatings compositions and formulations were identified that had stable hydrophobic surfaces and also had low pseudobarnacle adhesion values.

Properties

These self-stratifying coatings, phase separate into a low surface energy, low modulus top layer, with a tougher lower layer design. These systems are cross-linked, which results in the locking of the structure in place and resulting in a conformation that does not rearrange on exposure to water

Patents

This technology is patent pending with fully preserved U.S. patent rights available for licensing/partnering opportunities in areas other than "Marine Applications".

The Lead Inventor



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Dr. Webster worked for Sherwin-Williams Company where he was involved in resin development for industrial coatings as well as long-range research in new resins and crosslinking chemistry. While in Chicago, he helped develop the Coatings Technology program at DePaul University and taught a course in coatings resin technology. In 1993, he moved to Eastman Chemical Company where he led project teams in the areas of applications development for new monomers, new chemistry for coatings systems, and polymer development for coatings. He joined the Coatings and Polymeric Materials Department at NDSU in the fall of 2001.

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