



Non-Confidential Description
**Novel Siloxane-Polyurethane Coatings for
Anti-Fouling Applications**
Technology Case: RFT-231

Invention Summary

This NDSU invention describes a novel siloxane-urethane composition that may be used to form fouling-release coatings for applications such as protecting ship hulls and creating anti-graffiti paints. The coatings were developed from unique single-end-functional siloxane polymers, which are incorporated into polyurethane coatings and result in coatings having low surface energy but good adhesion and mechanical properties.

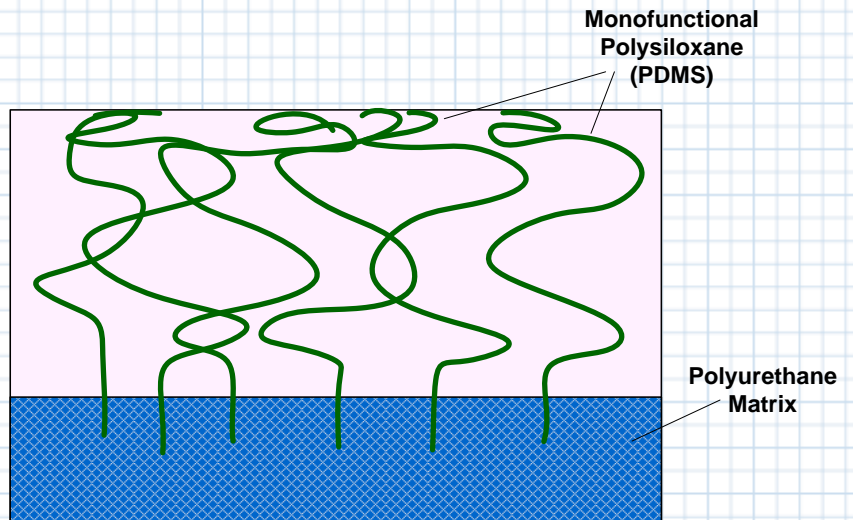


Figure 1: Cross section of a novel coating with a monofunctional polysiloxane (PDMS) anchored in a polyurethane matrix, to combine desirable attributes of both components.

Benefits

- These NDSU coatings exhibit excellent adhesion and mechanical strength, and low surface energy, significantly improved over currently available silicone-based fouling release coatings.
- Coatings are self-stratifying (self-organize into two or more distinct layers upon application), with a low surface energy, low modulus top layer and a tougher lower layer.
- Potential commercial significance in applications related to marine antifouling coatings, anti-graffiti and others.

Invention Premise

This NDSU invention is based on the synthesis of (PDMS) Polydimethylsiloxane-modified polyurethane coatings to generate coatings that have low surface energy under water due to the crosslinking, and are tough with good adhesion to various substrates. Multiple components were mixed and applied to the substrate where the solvent evaporated and crosslinking took place. Due to the low surface energy of the PDMS, it preferentially rises to the surface of the coating. However, due to the organo-functional end groups, it reacts with the isocyanate and becomes incorporated into the polymer network. This process creates a self-stratifying coating which separates into two or more distinct layers upon application; an outer layer with low surface energy and one or more durable lower layers. The PDMS component forms the top, low-energy layer, and the polyurethane component forms the durable underlayer.



Status

Optioned in "Marine Applications" Field of Use.
Available in All Other Fields.

Patents

This technology is patent pending with fully preserved world-wide patent rights available for licensing/partnering opportunities.

The Lead Inventor



Dean Webster, PhD

Dept. of Coatings and Polymeric Materials

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.

Center for Nanoscale Science and Engineering (CNSE)



The disclosed compositions were developed by researchers at NDSU's Center for Nanoscale Science and Engineering (CNSE). CNSE conducts large-scale, multidisciplinary research for government and industry. Located in a state-of-the-art research facility in the NDSU Research & Technology Park, CNSE's facility includes 77,000 square feet of cleanroom, laboratory, and engineering spaces and has design, synthesis, fabrication, and characterization capabilities. Core competencies include wireless miniaturized electronics design, prototype fabrication, research on polymeric and hard protective coatings, and materials for electronics and energy conversion.

Inquiries

Jonathan Tolstedt, Licensing Associate/Patent Agent
NDSU Research Foundation, Fargo, ND 58108-6050
Phone: 701-231-8173 Fax: 701-231-6661
Email: jtolstedt@ndsurf.org
Web: www.NDSURESEARCHFOUNDATION.ORG