

November 5th 2014

Oleophobic Coatings

*SOLUTIONS FOR
INCREASING
MISSION
READINESS*

UNITED PROTECTIVE TECHNOLOGIES LLC PROPRIETARY
INFORMATION

The information contained in this document is the property of UPT, and further dissemination is prohibited without the written permission of United Protective Technologies, LLC.

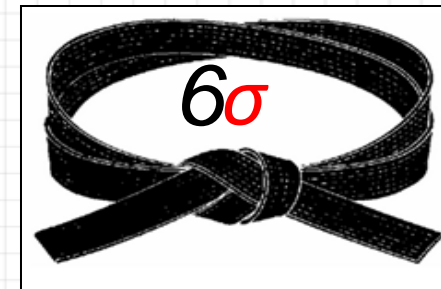
877.552.8744 | www.unitedprotec.com

Agenda

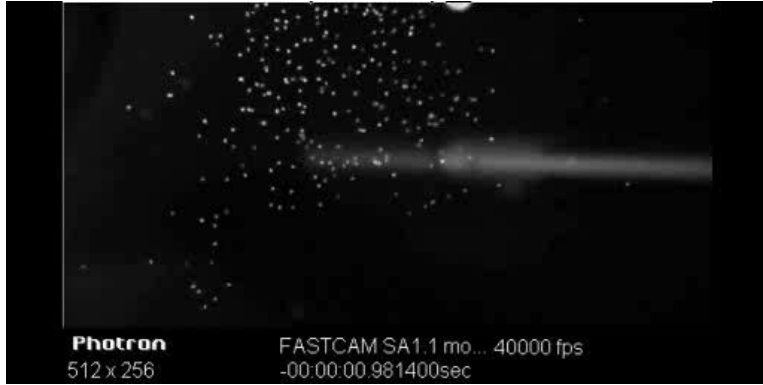
- Background
- Oleophobic coatings
 - Novel nanoparticles discussion as related to oil, water and ice displacement
- Q&A

United Protective Technologies

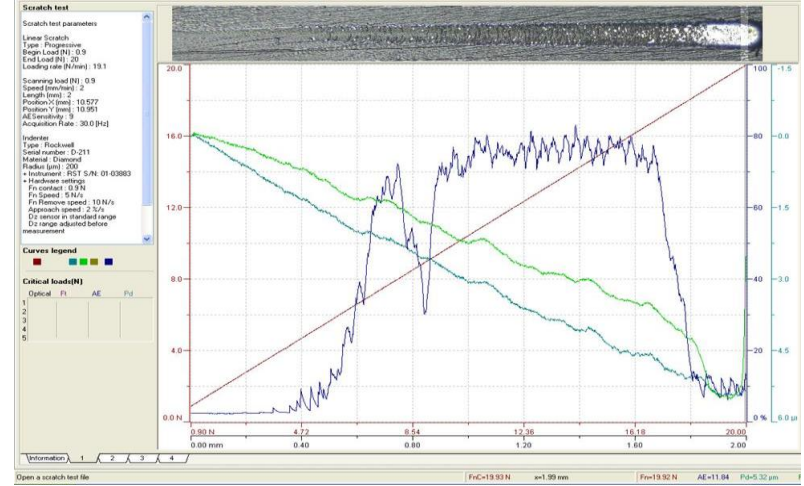
- Small Business
- Focus on developing innovative thin films and surface modifying materials since 2002
- Research & Development
- Commercial Production
- Highly creative team



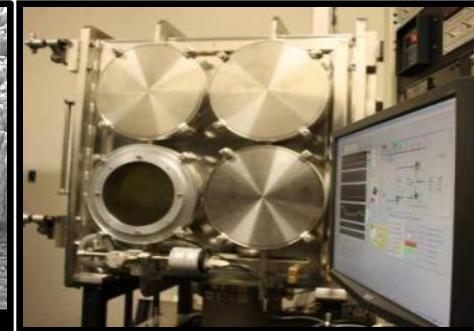
Research



EVIAC Whirling Arm Facility



Analytical and Testing Services

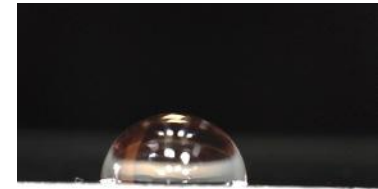
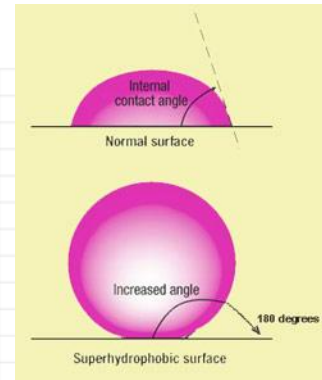


Specialty Coating Development

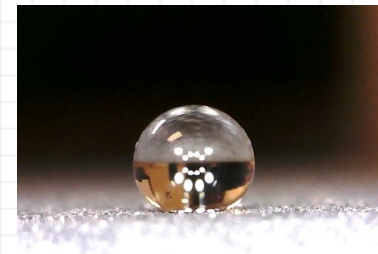
VELOX™ Particle Additive Technologies

What is Oleophobic?

- A surface with a low affinity for hydrocarbon based oils.
- Other properties include, reduced or eliminated ice formation, near superhydrophobic contact angle, and non-fouling/self-cleaning properties



RainX treated surface



VSH treated surface

VSH Coatings

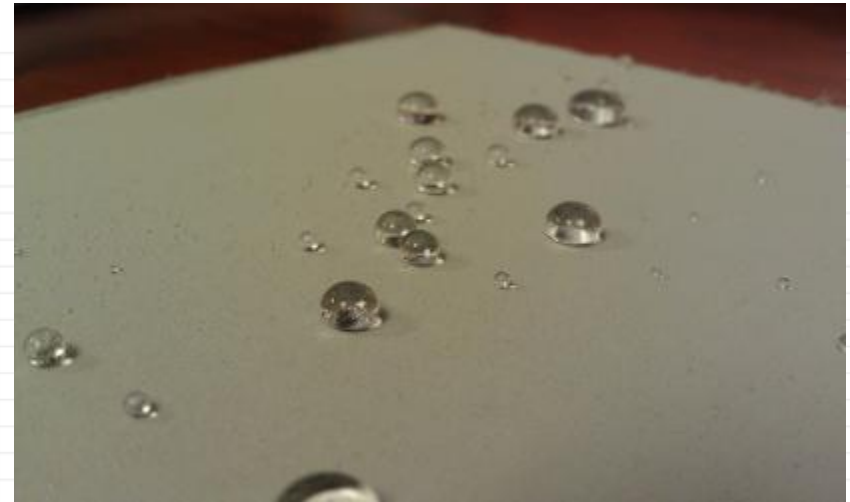
- **Technology**
- Applications
- Corrosion Resistance
- Environment
- Overview

Description: Velox™ Superhydrophobic (VSH) Coatings eliminate surfaces from being wetted, preventing the possibility of corrosion and biofouling.



Nanostructured SH

- Superhydrophobic coating based on surface topography and surface chemistry
- Pinned non-miscible fluid
- Water roll off angle $< 2^\circ$
- Exhibit oleophobic properties
- Passively icephobic
- Low weight
- Field applicable
- Field repairable



VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



- *Bilge Areas*
- *Low Wear/Corrosion Prone Areas*
- *Optical Surfaces*
- *Paint Additive*

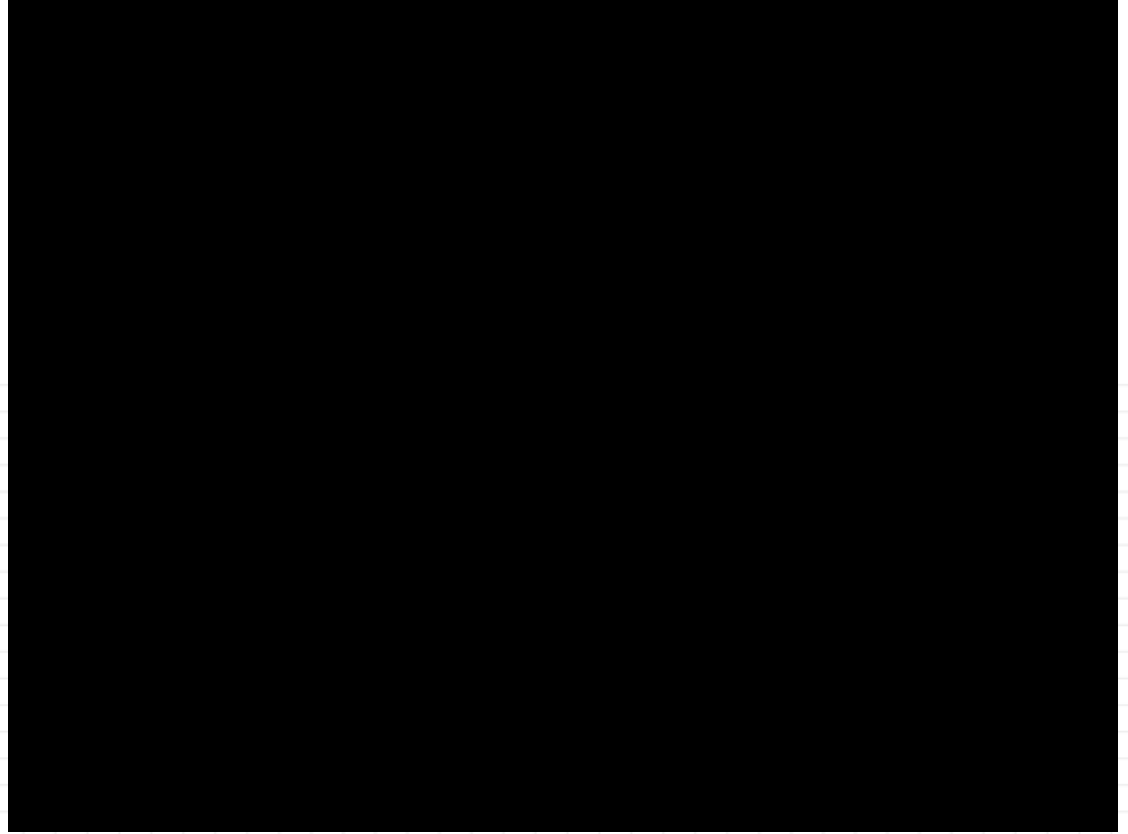
Optical Tensiometer Testing (Silane Trial)

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



Optical Tensiometer Testing

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



Oleophobic



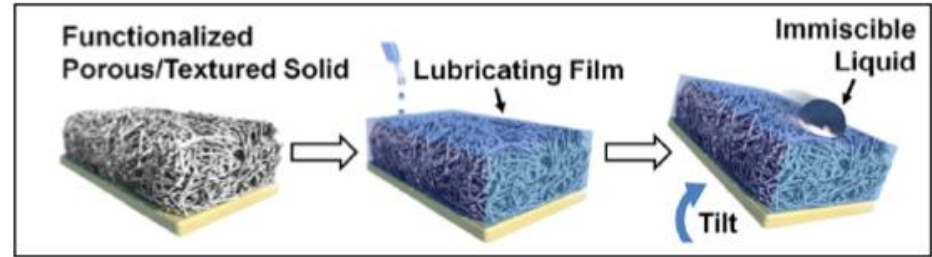
VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



VSH Icephobic

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



1 hour exposure
Deionized water @ 0-1C
Chamber and plates @ -10C
Droplet size up to 1 mm

VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview

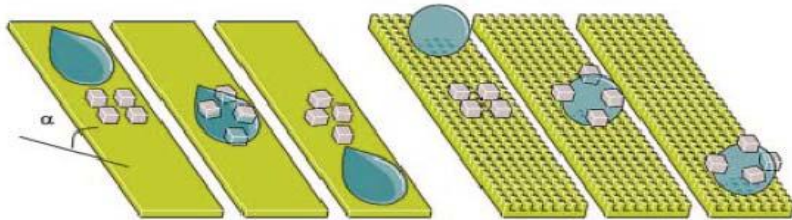
**Through the elimination
water or mineral
contact surface
corrosion may be
eliminated**



Corrosion resistance of proposed superhydrophobic coating on a 4" steel plate after 60 days of testing. Left side treated with superhydrophobic coating, right side is untreated.

VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



VSH Coatings

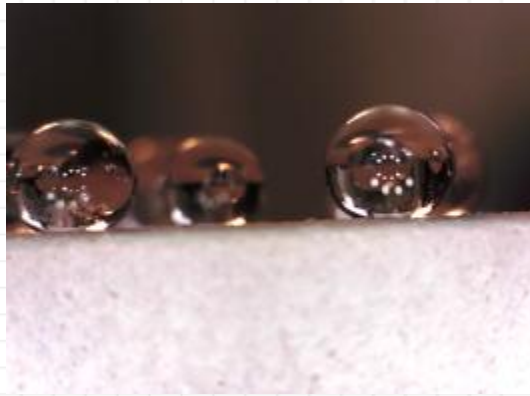
- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



Process produces no hazardous byproducts.

VSH Coatings

- Technology
- Applications
- Corrosion Resistance
- Fouling Resistance
- Environment
- Overview



- ✓ Superhydrophobic
- ✓ Icephobic
- ✓ Oleophobic
- ✓ Self Cleaning
- ✓ Non Fouling
- ✓ Lightweight
- ✓ Field Repairable
- ✓ Non-toxic
- ✓ Transparent Version



Questions and Comments





Thank You!!!!!!