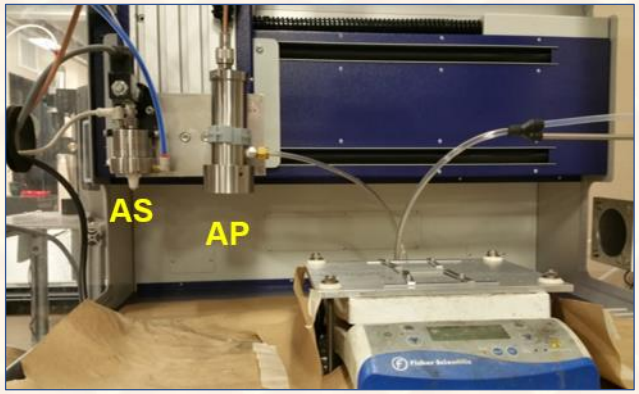
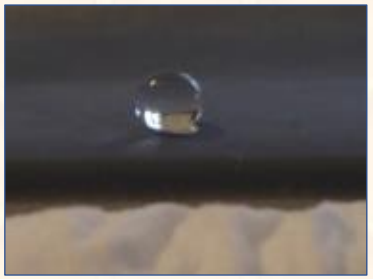
ATMOSPHERIC PLASMA (AP) / ATOMIZED SPRAY (AS) DEPOSITION

- **Dual-deposition system mounted on programmable robot head. Non-vacuum process.**





Superhydrophobic

Icephobic

ATTRIBUTES OF AP/AS METHOD:

- **Net-shape, no final finishing.**
- **Oxide coating matrix with addition of hard and/or solid-lubricating particles.**
- **Resistance to hot-acid corrosion and hard-particle abrasion.**
- **Hydro and ice-phobic surfaces that resist water wetting and ice formation.**

COATING TESTING AND EVALUATIONS

- **Two (2) commercial sliding-wear test machines to measure coefficient of friction, load-carrying capability, wear factor.**

ASTM G77 sliding-wear tester

ASTM G65 sand abrasion Tester (SDSM&T)

Providing Surface Engineering Solutions for Industry

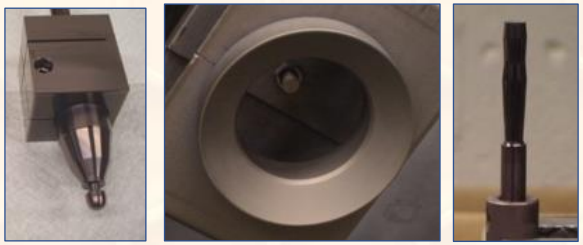
NanoCoatings, Inc.
525 University Loop, Suite 114
Rapid City, SD 57701
(303) 910-8463
www.americannanocoatings.com
Frank Kustas, PhD
fmkustas.nci@gmail.com

COMPANY MISSION

- Identify company needs / problems to propose surface engineering (SE) solution(s).
- Proposal & cost-estimates for prototype demonstration and test / evaluation validation.
- Work with customer to develop cost-effective, commercial-scale SE processing solutions.

COMPANY OVERVIEW

- Surface engineering (SE) consultation. PhD and MS-level Materials Engineering scientists.
- Nanostructured coatings for surface property improvement (wear, corrosion).
- Plasma-enhanced Physical Vapor Deposition (PE-PVD) for thin hard and lubricating surfaces.
- PVD of solid-state battery cell components.
- Plasma Electrolytic Deposition (PED) conversion coatings of value metals (Al, Ti, Zr, Mg) for thick low-friction performance.
- Atomized spray coatings for anti-tamper protection and water / ice repellent surfaces.
- Surface property measurements: sliding-wear, sand abrasion / erosion.



PVD coating of industrial parts

Plasma-Enhanced Physical Vapor Deposition (PE-PVD)

- PE-PVD chambers with different-scale processing capabilities.

18 in. diameter R&D system

36 in. diameter pre-production system

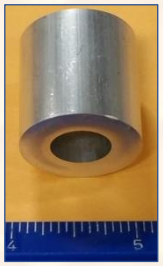
Attributes of PE-PVD Method:

- Thin coating, dimensional tolerances held
- Hard (ceramic), soft (metals), and solid-lubricants for low friction.
- Corrosion-resistance
- Thin-film, solid-state battery materials; cathode, electrolyte.
- Dry-processing, no liquid waste.

Plasma-Electrolytic Deposition (PED)

- PED systems with high voltage and high frequency switching capabilities.

PED processing of Al test coupon



Small Dia. Tube
Before PED

After PED

Larger Dia. Tube
After PED

Attributes of PED Method:

- Immersion process for complex shapes.
- Conversion of substrate, no distinct coating interface ⇒ good adhesion.
- Crystalline-oxide surface 3-5X harder than conventional hard anodize.
- Additions to electrolyte for low friction.
- Excellent corrosion resistance.
- Green electrolytes, no hazardous effluents.