

NanoSlic[®] NS 605 Ceramic LED Coating

INTRODUCTION

NanoSlic NS 605 is a revolutionary hydrophobic and oleophobic coating specifically designed to protect LEDs, LED circuit boards and associated electronic packaging. The coating renders the electronic package waterproof and chemically resistant. NS 605 provides advanced protection without changing the properties and color of the LED light output.

ATTRIBUTES

- Outstanding Water and Oil Repellency
- Electrically Insulating
- No Effect on LED Output
- Permanent
- Superior Adhesion and Abrasion Resistance
- Ultra-Thin Coating
- Room temp or Oven Curing
- VOC Free*

TECHNOLOGY

NS 605 is based on revolutionary **NanoSlic technology**. The advanced ceramic chemistry chemically bonds to surfaces while forming a hydrophobic/oleophobic layer at the air interface. NanoSlic 604 has a robust, abrasion resistant surface that repels water, oils and other chemicals. NanoSlic's silicon based ceramic chemistry makes it an excellent insulator. The ultra-thin coating allows advanced protection with minimal weight.

PRE-CLEAN

Prior to application surfaces should be free of fluxes, oils and other residues. Be sure that no lint, dust or other contamination remains prior to application of the coating.

APPLICATION

NS 605 can be spray applied; dip coated or wiped on with a lint free cloth, depending on specific design considerations. Coating should be done in a dust free area. In all cases, a consistent thickness and streak free layer should be achieved. NanoSlic 604 will obtain properties in the range of 2-4 microns dry film.

CURING

NanoSlic 605 will dry to tack free in 30 minutes. Do not disturb the coating or re-coat during this time. The coating will fully cure in 48 hours at room temperature. With this schedule a 9H hardness will be achieved. Curing can be accelerated by drying in an oven with added humidity. Additional data on cure schedules is available. In all cases the coating should not be put into an oven until drying at room temperature for 30 minutes.

Typical schedule is as follows:

1. Application
2. Room temperature dry 30 minutes
3. Oven, 1 hour @ 50-100C and 50-75% RH
 - a. Hardness: 7H
4. Overnight Cure
 - a. Hardness 9H

TEST RESULTS

Physical Properties	Values
Appearance	Clear Gloss
Specific Gravity @ 23°C	1.02 g/cm ³
Viscosity @ 23°C	1.96 cP
Nonvolatile content	28%
Static contact angle, water	105 Degrees
Static contact angle, n-hexadecane	64 Degrees
Refractive Index	1.4
Dielectric Constant (Volts/Mil)	12,000
Water Vapor Permeability	0.02 g/100 sq. in.

ENVIRONMENTAL

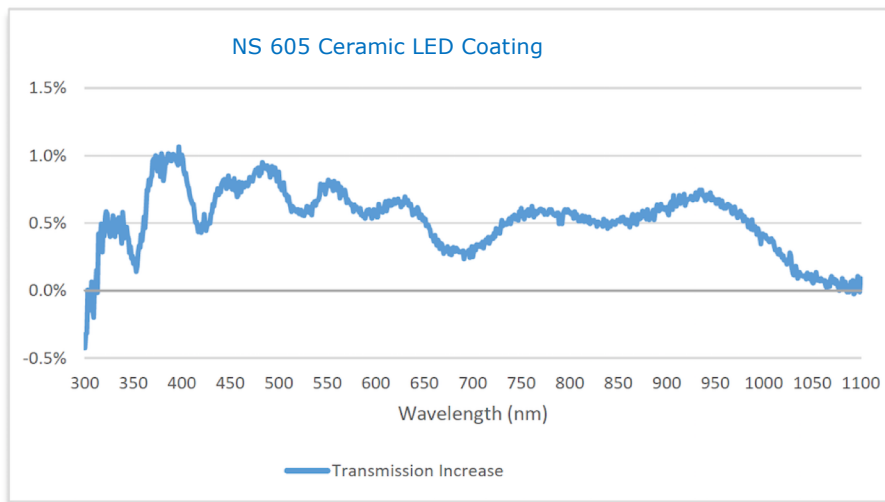
* NanoSlic coating solvents are not classified as VOCs and have been determined not to add to global warming. Contains no PFOA.



Standardized Test Results	Values
Color Shift	≥ 30K
Salt Fog ASTM B-117-11	500 Hours
Moisture & Insulation Resistance IPC-CC-830	6.9X10 ⁶ Meg
Hydrolytic Stability IPC-CC-830 85°C/95%RH, 1000 hrs	No Change
Abrasion resistance, ASTM D2486, Isopropyl Alcohol	>2000
Temperature Performance	350°F continuous 450°F intermittent
Abrasion/Wet Scrub ASTM D2486	
Contact Angle (H ₂ O) after 2000 scrubs	
Cotton	105°
Water/Sponge	105°
IPA	105°
Adhesion Cross-Hatch ASTM D3359	5B
Pencil Hardness ASTM D3363	9H

Light Transmission

All transmission measurements done in a Lambda Perkin Lambda 2 spectrophotometer.



Light transmission of NS 605 coated on glass. Transmission increase indicates anti-reflective properties.

Chemical Resistance

48 hour immersion Room Temperature	NS 605
Isopropyl alcohol	No attack
Arcosolv PM	No attack
Butyl carbitol	No attack
Butyl cellosolve	No attack
Butoxy triglycol	No attack
Dibasic ester	No attack
Dipropylene glycol	No attack
D-Limonene	stripped
Dowanol TPNB	No attack
Hexyl Carbitol	No attack
Hexylene glycol	No attack
Monoethanolamine (MEA 10% vol pH 11.60)	No attack
n-butyl alcohol	No attack
Pluronic L-64 5% wt	No attack
Potassium carb 47 (10% vol pH 11.50)	No attack
Propylene glycol	No attack
TKPP 60 16% vol (100g/L) pH 10.40	No attack
Triton X-100 5% wt	No attack