SK-220 TECHNICAL DATA SHEET

OVERVIEW - Hydrophobic – Oleophobic – Lubcricity-Abrasion Resistance

SK-220 is a proprietary perfluoropolyether silane that covalently bonds to glass, metal, and other hydroxide rich surfaces. SK-220 creates a transparent coating that is easy to clean, reduces staining, increases durability, and improves feel and lubricity. PVD (physical vapor deposition) is the preferred method for coating eye glass lenses, touchscreens, and other devices. PVD can also be used to hydroxylate-enrich plastic surfaces making plastic receptive to this coating. This TDS provides the basic steps for physical vapor deposition of SK-220, although they may be varied.

SK-220 is a hydrophobic and oleophobic perfluoropolyether silane. SK-220 provides long-lasting, anti-fouling, anti- fingerprint, and anti-smudge properties to properly prepared surfaces. SK-220 bonds tenaciously to glass, sapphire, metal, and other oxide rich surfaces. This produces a low surface energy, low refractive index, transparent, oil, water and stain repellent coating that is less than 10 nanometers thick and non-optically active.

Properties	
Names	SK-220
Product Codes	SK-220-D
Solids concentration	100% in vessel
Appearance	Copper/Steel/Ceramic Evaporant Pill
Chemistry	Silane PFPE
Density	1.55 g/ml
Flammable	Non-Flammable
Odor	Light ether-like odor
Cure Time	Room temperature for 12 hours or 15 minutes at 150°C
Shelf life	6 months to 1 year (dependent on storage conditions)
Storage	Room temperature in lightly closed container
Package options	Vacuum Sealed Evaporant Pill

APPLICATION NOTES

- Place clean substrates (glass, metal, etc.) in holders and load into PVD chamber

- Place SK-220 tablet face-up on the molybdenum or tungsten boat of resistance heater
- Pump the vacuum chamber down until the absolute pressure is less than 2.0 x Pa (2.0 x 10^{-5} Torr) - Ion clean the substrate for 3 minutes using Argon with or without oxygen (120V at 6A)

- On the last layer of the optical stack, Ion assist and E-beam evaporate SiO2 to deposit 10-15 nm of SiO2 (or whatever is appropriate for the stack) set to a deposition rate approximately 0.1-0.5 nm/s)

- Pump down the vacuum chamber until the absolute pressure is less than 2.0 x Pa (2.0 x 10^{-5} Torr) - Resistive heat evaporate SK-220. Deposit the entire sample of SK-220 from the loaded copper tablet i.e. 10-25nm being careful not to overheat the copper vessel.

- Use a Quartz Crystal Microbalance to monitor the deposition with the tooling factor = 1, acoustic impedance (z- ratio) = 1.0, density = 1.0. Typical current input is 80 -100A for resistance boat heaters. Less current may be required for resistive coil heaters. For resistance heaters temperatures under 300°C are preferred, deposition rates of 0.8nm/s and Quartz Crystal Microbalance thickness readings less than 20 nm. - Vent the chamber and remove the coated substrate parts.

Curing:

SK-220 is preferably coated onto hydroxide-rich surfaces via PVD and left to cure undisturbed for several hours in >50% RH conditions. However, SK-220 achieves its optimal properties with curing at 100 to 150°C for 15 minutes in a >50% RH environment. Curing at room temperature would require between 1 to 12 hours to achieve proper adhesion. For the best abrasion resistance, we recommend curing at the highest substrate safe temperature possible.

Post-curing:

If the coated surface appears oily or hazy, gently buff with a clean microfiber cloth.

COATING PROPERTIES

Color	Transparent
Cure temperature	25-150 °C

Pencil Hardness	>8H
Solvent Resistance: Water, Phosphate Buffer, Alcohol, Acetone	Excellent
Refractive Index:	1.3
Surface Energy:	12 mN-m-1
Dry Coefficient of Sliding Friction:	~0.6
Contact Angle Data for Borosilicate Glass Static Contact Angle to Water Static Contact Angle to Mineral Oil Sliding Angle to Water (200 µl) Sliding Angle to Mineral Oil (200 µl)	>110° >65° 4° 3°
Contact Angle to water after Exposure: Contact Angle after 24-hour Windex® Exposure Contact Angle after 24-hour Isopropyl Alcohol Exposure Contact Angle after 24-hour Acetone Exposure 10,000 Cotton Double Rubs 3500 #0000 Steel Wool Rubs 500g weight on eraser and 1,500 cycles (40 cycles/min) Methanol with 500g weight on eraser and 250 cycles (40 cycles/min) 48 hrs in pH 4.6 Buffer Solution Humidity for 120 hrs in 85°C and 85% chamber 4 hrs recovery time at room temp. Thermal shock: -40°C to 85°C, 1 cycle = 1 hr, Total 30 cycles	>110°