

POSS[®] PLUS⁺ for ESD Epoxy Coatings

The following slides are intended to assist those seeking to simplify the disentanglement, dispersion, ESD, and application characteristics of thermal and UV cured epoxy coatings containing nano-carbons.

Agent Must Haves

Step 1: Agent must fully wet-out CNTs

Step 2: Agent to aid the disentanglement & dematting of CNTs

Step 3: Mechanical dispersion should be fast and minimize CNT particles.

Step 4: Stability of dispersed CNTs and/or facile remixing is required.

Desirable Enhancements Beyond “Must Haves”

Minimize CNT loading.

Viscosity reduction.

Rapid levelling.

Uniform cure.

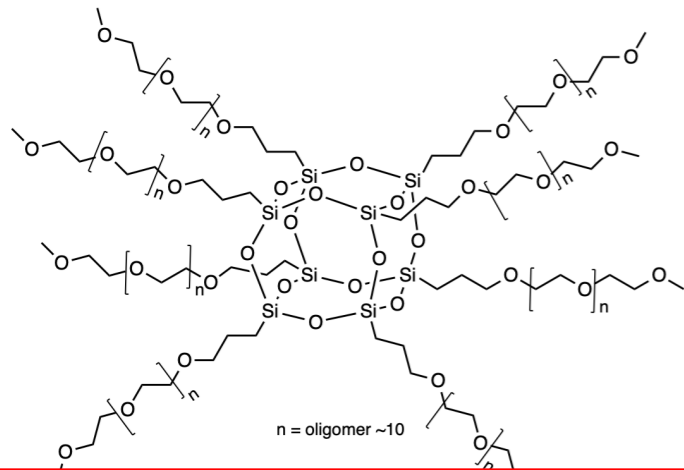
Gloss enhancement.

Compatibilization of pigments.

Speed of cure.

Minimize migration.

PG1190 PEG POSS®



Non-reactive diluent.

*fast wet-out

*detangles CNTs.

*disperses CNTs.

Epoxy Coating Sample in Aluminum Pans @100ppm [CNT]

With POSS® PG1190

Without POSS® PG1190

Formulations

Standard vs PG1190

Standard		POSS PLUS+	
EPON™ 862	43.0	EPON™ 862	50.0
CNT	0.02	CNT	0.02
Reactive Diluent	7.0	PG1190 POSS®	0.25
Quartz	46.0	Quartz	46.0
TiO ₂	3.0	TiO ₂	3.0
Dispersant	0.15	Dispersant	0.15
Defoamer	0.5		100 g
Leveler	0.2		
Wetter	0.07		
	100 g		

Value Added

More resin & durable

POSS® PG1190 + Desirable Effects:

viscosity, dispersion, levelling, wetting, adhesion, gloss, faster cure

70% faster mixing time

Note: 7 g Reactive Diluent vs 0.25 g PG1190

ESD Performance

24 μ thin cationic UV cured films

Similar findings for thermal cured formulations

	10 ppm CNT	100 ppm	200 ppm	500 ppm
Long CNT	$\times 10^7$	$\times 10^5$	$\times 10^4$	$\times 10^3$
Short CNT	$\times 10^9$	$\times 10^7$	$\times 10^6$	$\times 10^5$

- Not all CNTs are the same.
- Long CNTs are more effective at lower loadings.
- POSS[®] PLUS⁺ works with all CNT's (and graphenes)
- Other dispersants require much higher loadings.
- The recommended POSS[®]:CNT Ratio is 10:1

Dentanglement & Dispersant Summary

POSS[®] PLUS⁺

- Minimize CNT loading.
- Viscosity reduction.
- Rapid levelling.
- Gloss enhancement.
- Pigment compatibilization.
- Faster low shear mixing.
- Speed of cure.
- Minimize migration.