DOWSIL™ low-K acrylate silicone ink material (Developmental)

Low K material

What is K?

K is dielectric constant or permittivity

Why is low-K material needed?

- Parasitic capacitance unavoidable by OLED emitting layer
- Improving touch sensitivity by removing accumulated capacitance
- Low-K material desirable for TFE layer

Requirements for low-K dielectrics in electronic device

Common requirements

- Low K : 2.4X~2.5X
- Low viscosity : <20 cp @ 25°C, recommend 12~20 cp @ 25°C
- Inkjet process
- Good UV curability: 1 J/cm^2 by 395nm LED
- Solvent free
- Optically clear
- Hardness: Durable under CVD conditions
- Reliability: No out gas, no delamination, no bleeding
- Precise RI control

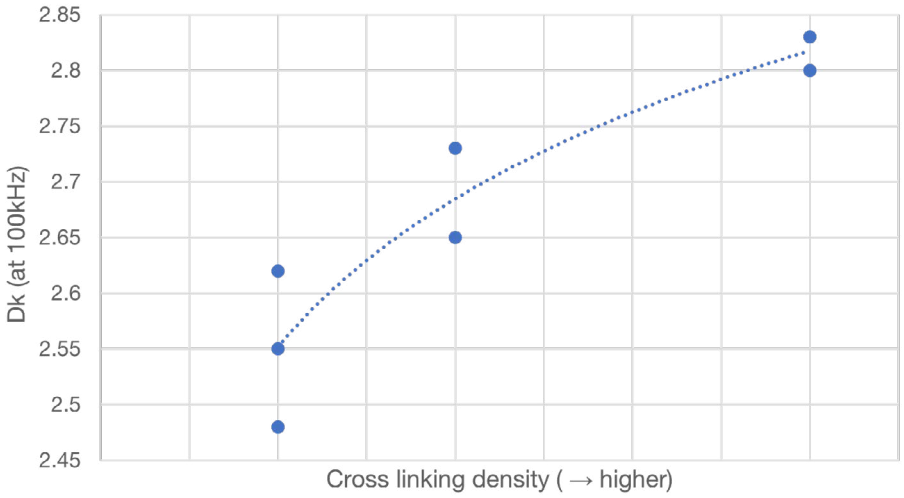
Why silicone?

- Excellent reliability
- Low shrinkage for planarization
- Good wettability for ink-jetting process
- Flexibility for foldable display

Compositional impacts and properties

Dielectric constant is a function of multiple parameters

- Increase cross linking density, which also increase Dk value
- We use special acrylate functional silicones and get very low Dk value



Low-K material properties

Cure condition: UV 1,000mJ/cm^2 @395nm (under N_2)

Properties		Value
Viscosity (cp)	Room temp.	16.5
Surface tension (mN/m)		25.90
Cure Degree (%)	by FT-IR	>95.00%
Dielectric Constant (25°C, 100KHz)	ITO + Ag electrode	2.48
Modulus G' (MPas, 25°C)	25°C	640
	70°C	36
Refractive index	Liquid	1.48
	Cured	1.50
Haze	8um thickness	<0.2
Transmittance (360~740nm average, %)	8um thickness	>99%

Reliability test result

No crack and color change

Glass type: *Bare glass*

Test condition: 85°C/85%
240h reliability test

Glass type: *SiNx glass*

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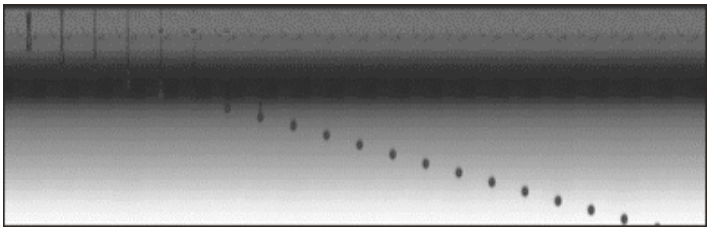
Inkjet test

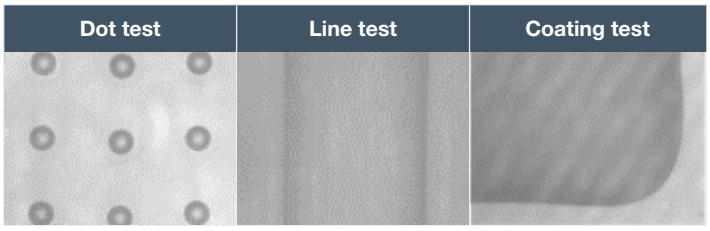
- Substrate: SiNx glass
- Inkjet head: KM 1024 head, droplet size: 25pL.

Jet-ability



No tailing, no satellite

Wettability



No tailing, no satellite

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