

# VC101



## Screen Printable Transparent Conductive Ink

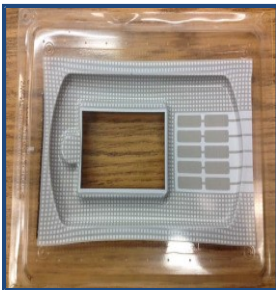
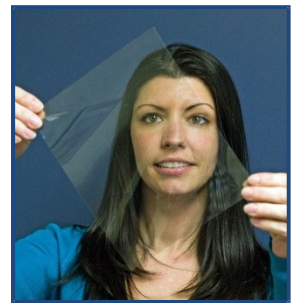
VC101 is a carbon nanotube (CNT) ink designed for screen printing transparent conductors on a wide range of plastic films, without the need for rinsing operations or high-temperature baking to remove surfactants, rheology modifiers. VC101 has three main components: (1) conductive CNTs produced using CoMoCAT technology, (2) Nafion® binder to promote adhesion, (3) solvent-based ink vehicle made using V2V™ viscous-to-vapor technology developed by Chasm Technologies (patents pending).

### Why VC101?



**VC101 is screen printable and adheres well to typical polymer film substrates.**

**Transparent conductors are environmentally stable, with neutral color and low haze (<0.5%).**



**Transparent conductors are flexible/stretchable, and can even be thermoformed to create 3D touch sensor designs.**

**VC101 is perfect for capacitive touch buttons and sliders to replace membrane switches in automotive interiors, home appliances, and medical devices, among other applications.**



### Let us help you!

The material scientists and engineers in CHASM's Application Development Center are available to help you integrate VC101 into your application.



# VC101

## Ink Properties

VC101 is built on Chasm Technologies' V2V™ (viscous to vapor) ink-vehicle platform.

- Solvent based, no surfactants
- Rheology engineered for screen printing
- Contains high-conductivity, high-purity single-walled CNTs (1 g/L)
- Contains Nafion® binder to promote adhesion
- Dries quickly at low temperature (~100 °C)

VC101 is available in alternative concentrations upon request. In combination with screen mesh selection, multiple print passes can be used to adjust sheet resistance (SR) and visible light transmittance (VLT) of screen-printed transparent conductors.

Expected VLT% (Coating Only)	Expected Sheet Resistance ( $\Omega/\square$ )	Mesh Number
86.3	837	325
88.2	1,080	325
88.5	1,132	355
90.3	1,570	325
91.0	1,750	355
93.2	3,700	355

Table 1. Expected VLT and SR values for multiple mesh types after a single screen print pass.

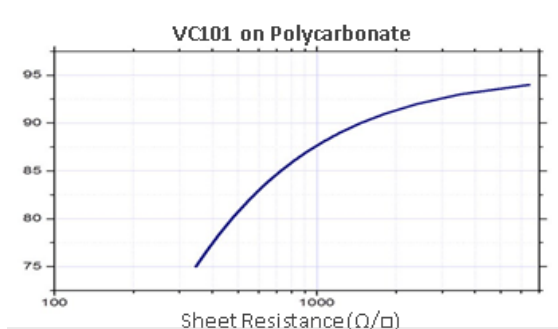


Figure 1: One pass with undiluted VC101 yields printed films with SR/VLT values in the target range for membrane switch replacement.

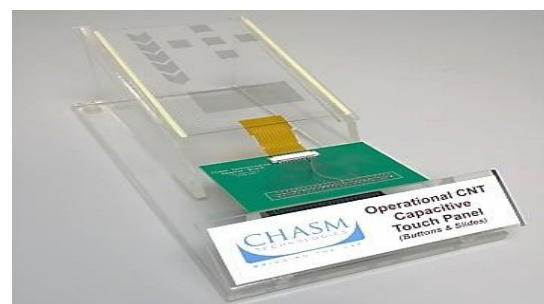


Figure 2: Capacitive touch sensor array screen printed with VC101. Sensor pads exhibit VLT values of ~85% and sheet resistance values of ~1,000  $\Omega/\square$ .

# VC101

## Processing

Engineered for screen printing, VC101 is a shear-thinning ink which rapidly rebuilds its viscosity ( $\eta$ ) even after prolonged agitation at high shear rates.

VC101 Shear Thinning

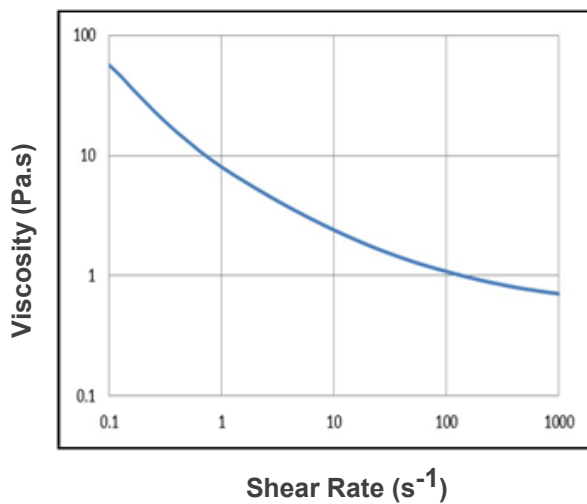


Figure 3. VC101 is shear thinning. At rest, it is a thick, viscous liquid

VC101 Viscosity Recovery

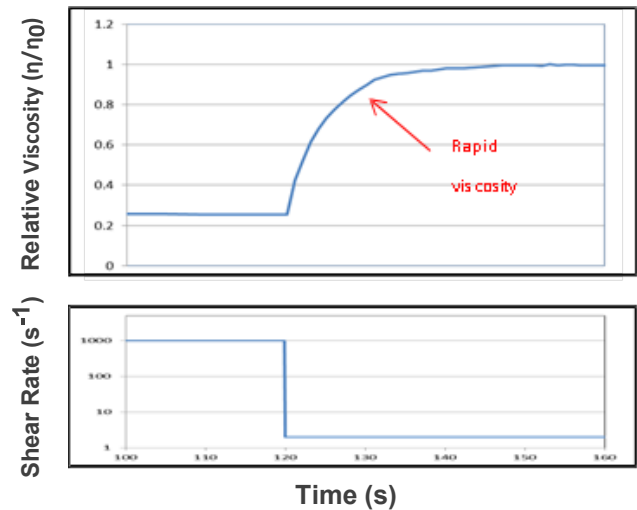


Figure 4: VC101 rapidly rebuilds its viscosity to pre-shear values within a few seconds.

Printing resolution is a function of ink, screen material, and mesh size. Owing to its rapid viscosity recovery, VC101 can be screen printed in fine lines with crisp edges.

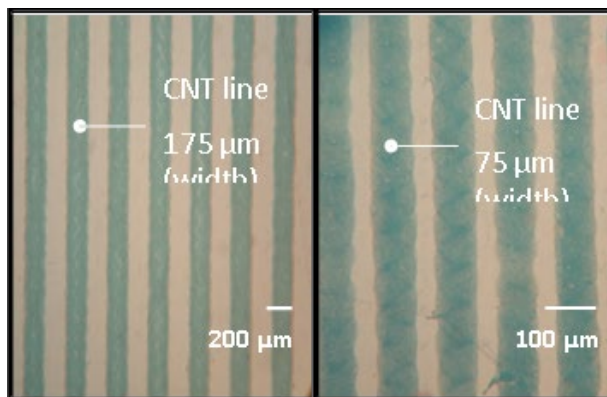


Figure 5: VC101 screen printed on PET in 175  $\mu m$  vertical lines (left) and 75  $\mu m$  vertical lines (right).

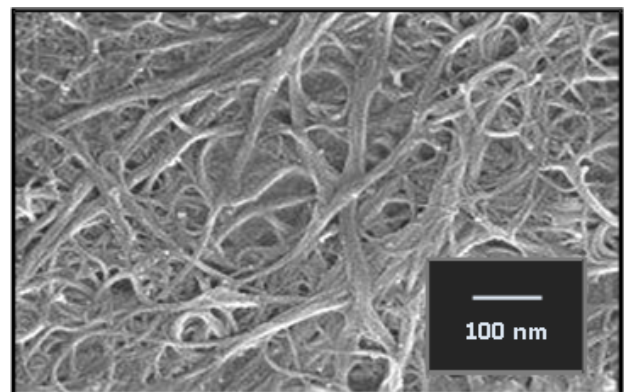
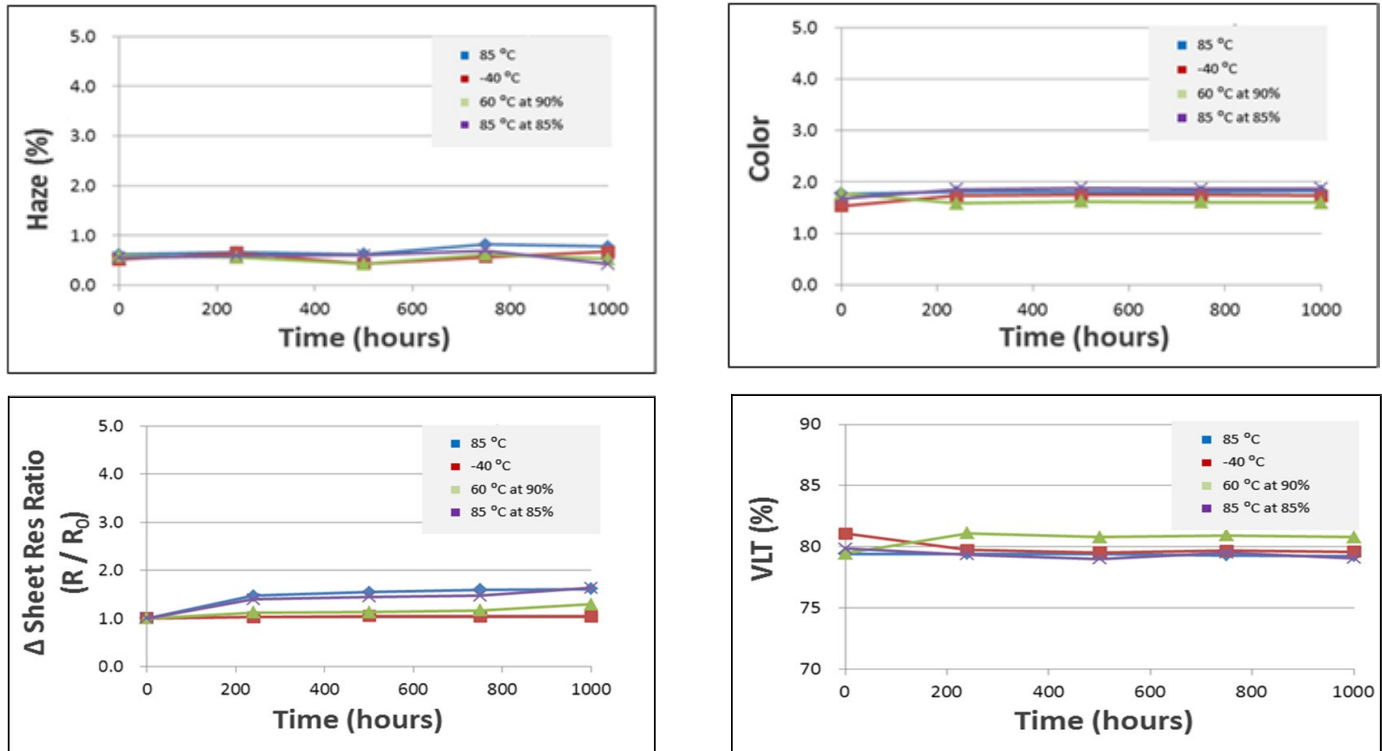


Figure 6: SEM image of VC101 CNT/Nafion network screen printed on PET at areal density of  $\sim 50 \text{ mg/m}^2$ .

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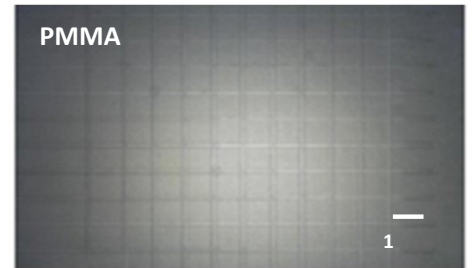
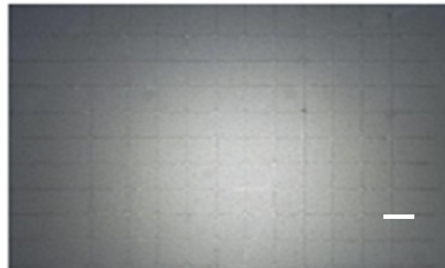
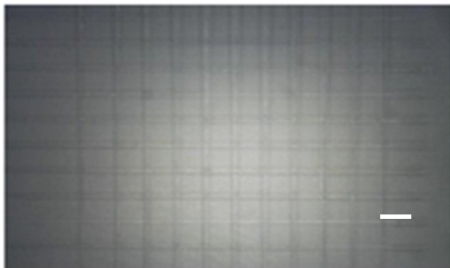
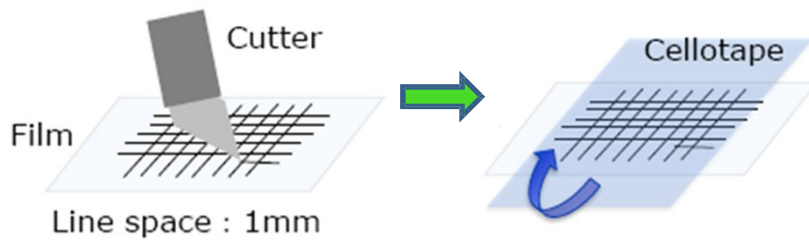
## Environmental Stability



**Figure 7:** VC101 exhibits exceptional environmental stability with regard to haze, color, sheet resistance, and visible light transmittance.

# VC101

## Substrate Adhesion



### Tape Test Methodology

1. Printed films are scored with razor and covered firmly with cellotape.
2. After 1-2 minutes, cellotape is peeled off rapidly in 90° direction.
3. As can be seen, VC101 exhibits excellent adhesion.

Applications Engineers are available to provide additional data and technical support to help you integrate Signis CNTs into your application. Email [sales@chasmtek](mailto:sales@chasmtek) to request additional information.

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