

CHASM Ag^eNT™-30

Hybrid Transparent Conductive Films



PRODUCT DESCRIPTION

Ag^eNT-30 is a Nanotube Hybrid Transparent Conductive Film (TCF) made by printing Carbon Nanotube (CNT) ink onto Silver Nanowire (AgNW) film to create a flexible TCF that is substantially better than either CNTs (more conductive) or AgNWs (more robust and lower cost patterning).

HOW AGENT™ WORKS

CNT ink is formulated for screen printing and is comprised of a mixture of our singlewalled CNTs (CoMoCAT™ technology), an optically clear polymer binder and our proprietary ink vehicle (V2V™ technology). The grade of CNT ink that is used for making Ag^eNT-30 product structures is CHASM-AGENT-VC201. CNT ink is available in standard 1L bottles.

AgNW film is made by coating AgNWs to random network of AgNWs on a continuous roll of clear plastic film substrate. AgNW layer is ~ 0.3µm thick. There are two substrate options for Ag^eNT-30: 1) 5-mil PET film with hard coat (HC) on the backside; 2) 7-mil PC film without HC on back side.

The grades of AgNW films that are used for making Ag^eNT-30 product structures are CHASM-AGENT-AW310 (5-mil PET film substrate) or CHASM-AGENT-AW321 (7-mil PC film substrate). AgNW film is available in standard sheet size up to 457mm X 605mm and can also be provided in 605mm or 1,210mm wide rolls.

OPTOELECTRONIC PROPERTIES

	Ag ^e NT-30 on 5-mil PET	
	TCF + Substrate	TCF only
Sheet Resistance (Ω/\square)	30	30
VLT (%)	87.8%	95.8%
Haze (%)	2.0%	1.0%
L*	94.38	-
a*	-0.71	-
b*	2.57	-

	Ag ^e NT-30 on 7-mil PC	
	TCF + Substrate	TCF only
Sheet Resistance (Ω/\square)	30	30
VLT (%)	87.1%	94.8%
Haze (%)	1.5%	1.0%
L*	94.10	-
a*	-0.73	-
b*	1.98	-

Optical properties measured by R-chek 4-point resistance meter, BYK Hazegard transparency meter or X-Rite spectrophotometer.

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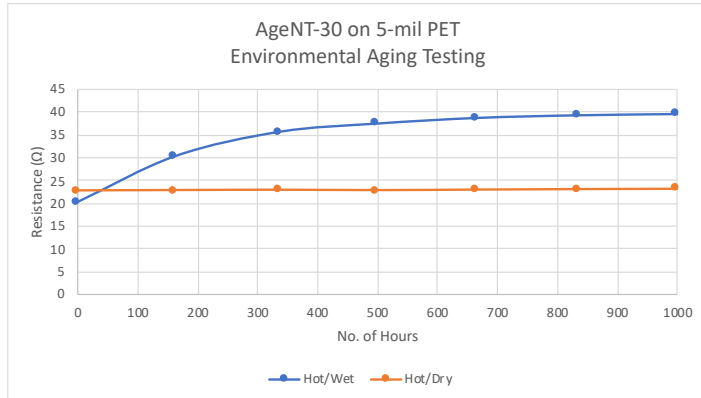
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ENVIRONMENTAL



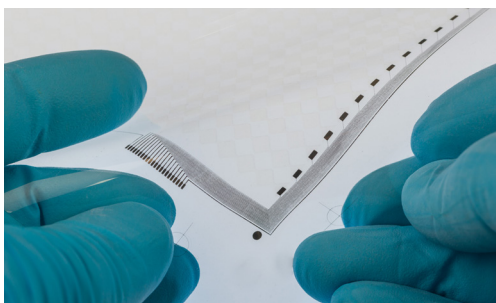
Resistance, adhesion and optical properties exhibit very stable behavior with environmental aging.

PE Release Liner
30 Ω/□ AgNW coating
5 mil PET Film
Hardcoat

AW310

PE Release Liner
30 Ω/□ AgNW coating
7 mil PC Film
PE Release Liner

AW321



PRODUCT BENEFITS

- Low sheet resistance with extremely high optical transparency
- Low materials and processing costs for creating patterned TCFs
- Can be flexed or formed for flexible, wearable, or 3D products
- Resistance, adhesion and optical properties are very stable with environmental aging.

TARGET APPLICATIONS

- Large Format Touch Screens
- Touch Sensors
- Transparent Heaters
- Transparent Electrodes for Lighting

SUPPORTING DATA

Flexible printed circuit (FPC) patterns are created by:

1. screen printing CNT ink on top of the AgNW film;
2. hot air drying at ~100°C;
3. chemically etching the exposed AgNW areas.

Typical etchant is Ferric Nitrate (industry standard for etching Silver). This affordable circuit patterning process is suitable for mass production and is referred to as "Print / Etch / Done". It has fewer steps & less waste streams than photolithographic etching, and is much faster than laser ablation. The CNT ink is a multi-functional material that acts as a printed etch mask (for low-cost patterning) and also encapsulates the AgNWs (to create a more robust TCF).

AgeNT-30: 30 Ω/□ at 95% VLT

DISCLAIMER

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on CHASM's accumulated experience as of the date of publication. Product performance will vary based on application and operational environment, so CHASM Advanced Materials Inc. is not liable for the suitability of our product for the intended applications and results.

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