

Product Description

A carbon paste for perovskite solar cell to produce high conductivity electrode structures. Dycotec DM-CAP-4703S is a thermoplastic carbon paste for screen printing and blade coating. The paste allows fast drying at low temperature (<100°C) with a sheet resistance of <10 Ω/sqr /25µm. Proprietary additives are incorporated into the paste to increase work function to enable improved charge transfer from perovskite layers (~35 meV increase compared to undoped carbon paste, DM-CAP-4701S). The paste offers a low cost and stable alternative to gold sputtering.

Product Benefits

- Compatible with Perovskite solar cells, enabling excellent power conversion efficiency
- Modified work function to enable improved charge transfer (~35 meV increase with respect to undoped DM-CAP-4701S)
- Compatible with flexible perovskite solar cells
- Low temperature (<100 deg. C) and rapid drying (<20 mins)
- Excellent long term durability performance

Paste Preparation

Gently stir before use. Avoid rapid stirring to prevent air entrapment during the stirring process. Once the paste has been removed from the container for printing, this may introduce contamination. Please do not replace the paste in the original container and keep the lids tightly sealed with the inner cap replaced after paste transfer to minimise solvent evaporation. The paste dries rapidly, so screen residence times are limited to <2 hours.

Properties of the Uncured Paste

Test	Typical Properties
Viscosity (Pa.S) (Kinexus Ultra+, Cone & plate, 50s ⁻¹ , 25°C)	7 - 18 Pa.s
Thinner	This should normally not be required. If necessary, use DM-CAP-4703-DT for slight adjustments in viscosity.
Solids Content (150°C)	43-46%

Paste Processing Conditions

Parameter	Typical Properties
Substrate	Perovskite solar cells, PET
Deposition Method	Flat-bed screen, syringe printing* or blade coating
Screen	180 mesh PE, 45µm wire diameter, 22.5°, 13 µm emulsion
Flood speed	50 mm/s
Print speed	50 mm/s
Squeegee hardness	80A Shore A Durometer
Squeegee Pressure	5 Kg (over 22.2 cm)
Squeegee angle	60°
Print gap	1.8 mm
Number of strokes	1
Screen Residence Time	<2 hrs using a print-flood process

* Please contact Dycotec Materials at info@dycotecmaterials.com for syringe packaging options

Print structures should be processed at 70°C in a convection oven for 20 mins. Typical cured thickness is 12-13 µm (PET). A print-flood print process sequence should be used to avoid premature drying of the solvents and screen blockage.

Properties of the Cured Paste

Test	Properties
Sheet Resistance (70°C cure, 20 mins)	<10 $\Omega/\square/25\mu\text{m}$
Cross Hatch Adhesion (PET)	5B
Pencil hardness scale	7B
Flexibility (ASTM F1683, 5 cycles)	No resistance change after flex test (40mm diameter tube)
Work Function	35meV increase compared to undoped carbon

Clean-Up

Equipment can be cleaned using alcohols such as non-polar solvent eg Shellsol A.

Storage and Shelf-life

Containers should be stored at room temperature (10 – 25°C) with lids tightly sealed. The material should not be stored at temperature below 0°C or greater than 25°C. Dycotec Materials cannot assume responsibility for a paste that has not been stored in appropriate conditions or where the pastes have been contaminated following use.

The paste shelf-life for an unopened container is 6 months

Safety and Handling

For safe use of this product, please review relevant material safety and datasheet (MSDS).

For more information, please contact:

Dycotec Materials Ltd
Unit 6, Stanier Road
Porte Marsh Industrial Estate
Calne, Wiltshire, SN119PX, UK
Email: Info@dycotecmaterials.com
Tel: +44 (0)1793 422598
www.dycotecmaterials.com

All information reported in the datasheet is for experimental work undertaken in our laboratories and illustrates typical values only. Processing conditions may vary depending on customers' experience and their application requirements and manufacturing process equipment set-up.

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