

DuPont Metallization Paste Offerings

DUPONT™ SOLAMET®

Increase efficiency and yield of your solar cells with
DuPont™ Solamet®

Photovoltaic Application

DuPont™ Solamet® offers a comprehensive system of thick-film materials used in the construction of photovoltaic (solar) cells.

The material properties and functional requirements of the front and back sides of PV wafers dictate significant differences in the functionality of thick-film metallization pastes. The front side is responsible for absorbing light and generating most of the electrical carriers. The thick-film conductor has the role of efficiently contacting the Si and transporting the photo-generated current without adversely affecting the semiconductor properties and without damaging the p-n junction. The back side should have an enhanced Back-Surface Field (BSF) to give a higher voltage difference.

FRONT SIDE Conductor Requirements

- **Controlled penetration of barrier layers**—essential for making good electrical contact to the doped n-type layer, thus achieving a low contact resistance
- **High conductivity**—achieves a low resistance in the bus and grid lines of the front-side metallization which is important in today's large cells with dimensions of 156 mm or more
- **Good line resolution**—tracks must be narrow to maximize the area available for illumination

DuPont Product Offering: FRONT SIDE

Selection of the correct front side conductor composition can be complex, as system performance is sensitive to the cell structure, the Anti-Reflective Coating (ARC), and the firing profile. Careful optimization of the materials and process is required for best results.

DuPont offers the following pastes:

- **Solamet® PV14x**—the current market leader used extensively around the world, with PV149 as the new high performance member
- **Solamet® PV15x Cd-free Series**—introduced to address the market need for more environmentally sustainable products with PV155 as the new member
- **Solamet® PV17x Cd-free and Pb-free Series**—developed to enable a full Pb-free system to be implemented
- **Solamet® PV135**—low contact for back contact cell configurations

BACK SIDE Conductor Requirements

- **Good Back Surface Field (BSF)**—aluminum provides enhanced p-type doping and impurity gettering by alloying with silicon
- **Low Bow**—enables the use of thinner, larger wafers thereby improving silicon utilization and cost
- **High Speed Printing**—enables faster throughput on modern, high volume production lines

DuPont Product Offering: BACK SIDE

Selection of the correct back side paste is complicated by the front side silver paste since the two are co-fired. DuPont technical service should be consulted to develop optimum firing conditions.

DuPont offers the following pastes:

- **Solamet® PV202 (Cd-free)**—the standard Ag/Al product
- **Solamet® PV322 (Cd-free and Pb-free)**—first generation low bow product
- **Solamet® PV333 (Cd-free and Pb free)**—first generation fritted low bow product
- **Solamet® PV344 (Cd-free and Pb-free)**—second generation low bow product
- **Solamet® PV381 (Cd-free and PB free)**—second generation fritted low bow product



The miracles of science™

TABBING Conductor Requirements

- **High Adhesion**—for greater reliability
- **Good Solderability**—for high speed automatic processes
- **Good Print Resolution**

DuPont Product Offering: TABBING

DuPont offers the following pastes:

- **Solamet® PV202 (Cd-free)**—Ag/Al is used extensively for applications where the back plane is combined with the solderable pads
- **Solamet® PV502 (Cd-free)**—first generation Ag
- **Solamet® PV585 (Cd-free and Pb-free)**—second generation Ag

For more information on Solamet® or other DuPont Photovoltaic Solutions, please contact your local representative:

Europe

Du Pont de Nemours (Deutschland) GmbH
Peter Weigand
Du Pont Strasse 1
61352 Bad Homburg v.d.H.
Germany
Tel: +49-6074-861225
peter.weigand@deu.dupont.com

Asia

DuPont Taiwan
Hiroki Kojo
45, Hsing-pont Road
Taoyuan Taiwan 330
Tel: +886-3-377-3658
hiroki.kojo@jpn.dupont.com

Low Temperature Silver Metallization

DuPont offers a range of new polymer-based silver conductors for use on ITO and ZnO transparent conductor oxide layers for front side grid applications in thin film CIS, CIGS and amorphous silicon cell structures. In this case, the metallization does not contribute directly to the cell function and the key attributes are high conductivity, low contact resistance and good adhesion to the underlying layer. DuPont recommends Solamet® conductors PV 4xx. These pastes provide low resistivity and can be cured at 120°C - 150°C in order to form a conductive contact.

DuPont China Holding Co., Ltd.
Li Guang(L.G.) Fu
15th Floor, Shui On Plaza
333 Huai Hai Road(Central)
Shanghai 200021, China
Tel: +86-21-6386-6366 ext 2304
Li-Guang.Fu@chn.dupont.com

Americas

DuPont Microcircuit Materials
Beverly Johnson
14 TW Alexander Drive
Research Triangle Park, NC 27709
USA
Tel: +1-919-248-5014
beverly.s.johnson@usa.dupont.com

photovoltaics.dupont.com

©2007 DuPont. All rights reserved. The DuPont Oval Logo, DuPont™, and The miracles of science™ and Solamet® are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates.

Brand: Solamet® trademark may only be used under licensing agreement granted by DuPont for use on approved applications.

This information corresponds to our current knowledge on the subject. It is offered solely to provide possible suggestions for your own experimentations. It is not intended, however, to substitute for any testing you may need to conduct to determine for yourself the suitability of our products for your particular purposes. This information may be subject to revision as new knowledge and experience becomes available. Since we cannot anticipate all variations in actual end-use conditions, DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent right.

Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement, H-51459 or H-50102-2.



The miracles of science™