

Product Information

Organic Photovoltaic Ink System, PV 2000 System

Catalog Number **772364**

Storage Temperature 2–8 °C, Do Not Freeze

Technical Bulletin AL-271

TECHNICAL BULLETIN

Synonym: Plexcore® PV 2000 Ink System

Product Description

Plexcore® PV 2000 is a ready-to-use ink system consisting of two inks custom-designed to work in tandem, a photoactive ink and a hole transport layer ink. This kit provides both high purity inks required to construct a high-performance organic photovoltaic (OPV) device.

Performance (organic photovoltaic cell efficiency) up to 6% [NREL (National Renewable Energy Laboratory) Certified] can be achieved with this ink combination.

The p/n ratio, solvent system, and hole transport layer technology for this ink system have been optimized for high performance. Other photoactive and hole transport layer materials are available commercially, and many fullerene derivatives, as well as others molecules, have been reported in the literature. For these materials, performance factors must be optimized for the device to perform efficiently.

Components

| | |
|-------------------------------------|-------|
| Photoactive Ink | 25 mL |
| ICBA/P3HT mixture | |
| 2.2% in dichlorobenzene | |
| Hole Transport Ink | 25 mL |
| Sulfonated polythiophene | |
| 1.8% in 2-butoxyethanol:water (2:3) | |

Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

Preparation Instructions

The Photoactive Ink may need to be heated to 50–80 °C prior to application in order to become homogenous. Handle the Photoactive Ink in an inert atmosphere protected from light.

Allow the Hole Transport Ink to come to room temperature prior to application. The Hole Transport Ink may be used in air or an inert atmosphere.

Note: **DO NOT heat** the Hole Transport Ink component as degradation may occur.

Each of the solutions is filtered prior to shipment and the ink solutions should be free of any particles prior to coating. The Photoactive Ink may be filtered upon application using a microdisc PTFE membrane (0.45 µm). The Hole Transport Ink may be filtered upon application using a Millipore Millex® HV PVDF membrane (0.45 µm).

Storage/Stability

Store the kit components at 2–8 °C. Do Not Freeze.

Note: The Photoactive Ink is packaged under nitrogen, and should be stored under an inert gas (nitrogen or argon) and protected from light. The Hole Transport Ink should be protected from direct sunlight, and discarded with appearance changes from homogeneous and particle free.

Procedure

Note: Handling in an inert atmosphere (nitrogen or argon) is recommended.

OPV Architecture (see Figure 1):

Transparent Substrate - Glass

Transparent Anode - typically Indium/Tin Oxide (ITO), 30–150 nm

Hole Transport Layer (HTL) - Plexcore HTL 2000, 60 nm

Photoactive Layer - Plexcore PV 2000 Photoactive Ink, 80–220 nm

Cathode – metal(s) 50–210 nm

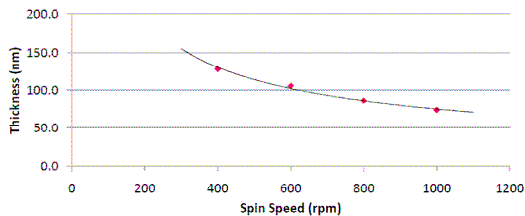
Substrate Preparation

Prior to spin coating, typical substrate preparation might include cleaning by ultrasonication in a series of solutions (water with soap, water, acetone, isopropyl alcohol) followed by UV/ozone treatment immediately before HTL ink application.

Deposition of Hole Transport Ink via Spin Coating

Hole Transport Layer - Spin coat the Hole Transport Ink onto the structure. Each spin coater is different and must be calibrated by producing a spin curve (see Figure 2). This is a general guideline of film thickness versus spin speed (rpm). The HTL ink is applied and dried prior to photoactive ink coating.

Figure 2.
Typical Spin Curve for Hole Transport Ink



Annealing Conditions for Hole Transport Ink

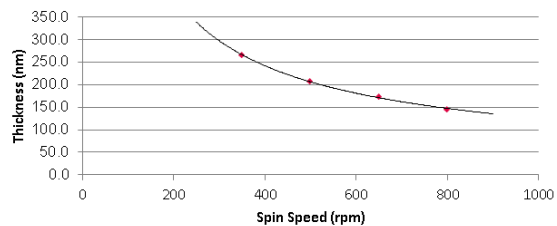
The film should be annealed at preferred temperatures of 110–175 °C on a hot plate for 15–30 minutes in air or an inert atmosphere.

Note: Temperature should not exceed 180 °C.

Deposition of Photoactive Ink via Spin Coating

Photoactive Layer – After allowing the HTL ink to dry, spin coat the Photoactive Ink onto the structure. Each spin coater is different and must be calibrated by producing a spin curve (see Figure 3). This is a general guideline of film thickness versus speed (rpm).

Figure 3.
Typical Spin Curve for Photoactive Ink



Annealing Conditions for Photoactive Ink

The film should be annealed at 110–175 °C on a hot plate for 15–30 minutes in an inert atmosphere.

Note: Temperature should not exceed 180 °C.

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Product of Plextronics, Inc. U.S. Patent 6,166,172 and US 7,671,173 B2

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Figure 1.
Organic Photovoltaic (OPV) Cell Structure showing Plexcore PV Ink System

