

# PChem Associates

## Ultrafine Metal System for Printed Electronics

### Case Study: Displays Interconnects

#### *Opportunity*

A credit card issuer identified an opportunity to add new antifraud protections to their line of credit cards. They and their card supplier recognized that the planned display feature on the card would require a novel and inexpensive conductive interconnect material to support the new display. To complete commercialization, a novel print process and requisite materials to support the circuitry that power the display will be necessary.

#### *Challenge* - Find a partner to develop a conductive material that will:

- Print Flexographically
- Process at speeds up to 300 feet per minute
- Result in highly conductive, well adhered conductive traces
- Utilize the current printing press with only minor modifications
- Have an overall thickness no greater than 1 micron
- Exhibit superior flex resistance (less than 2% change in resistance after 100 flexes around a 1/8" diameter mandrel)

#### *PChem Solution*

PChem proposed a collaborative three-way development effort with the client, their printing vendor and PChem's Ink Engineering support team. A series of conference calls enable PChem's engineers to put together a requirements specification that guides the collaborative effort.

It was quickly recognized that commercially available conductive ink systems could not match the major requirements of flexographically printing to the desired 800 nm cured thickness, with a low temperature cure, that results in a product with low electrical resistivity and good adhesion.

PChem suggests using its [PFI-200](#) nanopowder, which contains silver particles that are 15-30 nm in diameter formulated into a flexography ink. The printed circuit cures in seconds at 120°C. The resulting cured circuits have very low resistance.

Initial print trials were performed in PChem's lab to refine the formulation and to validate that the final material met client requirements. Once PChem's team with the printing vendor had perfected the nanopowder-ink formulation, samples were sent to the printing vendor for full scale testing. The resulting live trials confirmed that PChem's silver nanopowder met the client's requirements. The trials also identified areas for improvement in viscosity and optimal print press speed.

## ***End Result***

The client's print vendor was able to support the client new anti-fraud protections. The vendor was able to lock in additional business from the client as well as identify new business opportunities with other clients. In addition, the overall cost of PChem's silver nanopowder proved much less than competitive alternatives.

### **PChem Associates – Background Information**

Founded in 2004, PChem Associates is developing ultrafine (nanopowder) metal systems for a variety of applications including printed electronics, RFID, medical applications, and Fuel Cells.

The company is located on the high-tech Route 1 corridor between Princeton and Rutgers Universities, about 1 hour from New York and Philadelphia.

For more information on PChem Associates and the nanometal technologies we are working on, contact us at:

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