

# Blackhole

## Direct Metallization

### Versatile And Cost Efficient, The Worldwide Choice For Direct Metallization

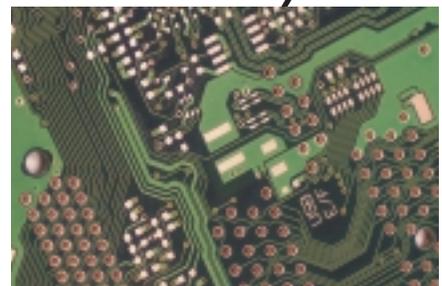
**MacDermid Blackhole** is the choice of fabricators worldwide that prefer a low cost, environmentally friendly direct metallization alternative to electroless copper. Suitable for both simple and complex circuit boards, carbon-based Blackhole is a nanoscale electrostatic coating that satisfies every need for reliability and versatility.

Trusted by over 250 of the world's leading manufacturers, **Blackhole** is an automated, horizontal process whose unique technology enables users to reduce cycle time, decrease overall water consumption, completely eliminate the use of formaldehyde, and produce less waste than electroless copper plating. Another innovation from the leaders in metallization, Blackhole is also the world's first totally chelator-free process. Able to provide high performance results in conventional, flexible and complex multilayer circuit board designs, MacDermid Blackhole is the most technically capable and cost effective option available today.

When you want the industry's highest value through-hole metallization solution, count on the company that says "Yes We Can." MacDermid.

#### Key Features

- Lowest cost direct plate alternative to electroless copper
- Direct copper-to-copper bonding improves reliability
- No chelators, formaldehyde or added metals
- Compatible with all circuit board types
- Horizontal conveyerized process
- Engineered for reliability and performance



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### The Lowest Cost Through-Hole Metallization Process Available

PCB fabrication costs are the result of many factors: chemical consumption, waste production, engineering support, and process yield, among others. **Blackhole** provides a value in use which drops right to your bottom line. The world's most efficient direct metallization process minimizes costs associated with installation, operation and final product yield. Chemical consumption is an order of magnitude lower than electroless copper systems, reducing maintenance, analysis and replenishment time. Fewer, shorter process steps dramatically reduce the cycle time while minimizing rinsing and waste-treatment requirements. Its horizontal automation is equally well suited to high volume or quick-turn, prototype production.

MacDermid's unrivaled experience with direct plate chemistry, equipment, and process control results in a trouble-free metallization solution.

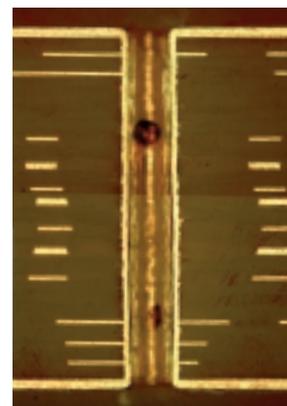
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It takes more than innovative, high performance products and superior technical service to help our customers compete and win in today's global marketplace. It takes a total commitment to understanding their needs and the ability to provide the right solutions—every time.

When success is your only goal, trust the company that says "Yes We Can."

### Value-in-Use Cost Savings

BLACKHOLE		ELECTROLESS COPPER
2 to 3 min.	<b>Start-up Time</b> <b>97% Savings</b>	90 min.
8 min.	<b>Cycle Time</b> <b>87% Savings</b>	60 min.
7 mL /ssf	<b>Chemical Replenishment</b> <b>90% Savings</b>	70 mL /ssf
6 L /min.	<b>Water Consumption</b> <b>88% Savings</b>	50 L /min.
20 mL /ssf	<b>Waste Water Treatment</b> <b>90% Savings</b>	200 mL /ssf



Blackhole enables a uniform electrolytic coating and an intimate copper-to-copper bond for highest reliability interconnects.



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