**AEROSOL JET® Materials FAQs**

Aerosol Jet systems have the unique ability to directly print a wide range of electronic and biological materials onto almost any substrate. The Aerosol Jet deposition process supports a broad range of commercially available materials, as well as custom formulations.

### Min/Max Printable Feature Sizes for Aerosol Jet Systems

**MINIMUM FEATURE SIZE IS MATERIAL DEPENDENT:**
- ~10 µm features consistently printed on SiO₂
- Pitch between lines can be ~20 µm

**MAXIMUM FEATURE SIZES ARE USER CONTROLLABLE:**
- 3 mm or greater using a wide nozzle print head
- With multiple passes, features sizes are limited to the size of the underlying substrate

### TYPICAL PARTICULATE BASED INKS FOR AEROSOL JET SYSTEMS:

**SOLVENTS:**
- High boiling point / low vapor pressure (compare to ethylene glycol)

**PARTICLES:**
- Size: 300 - 500 nanometers maximum; < 200 nanometers preferred
- Solids content: 5 - 70 wt%
- Multiple solid components, if used (e.g. silver and glass frit) should be equally dispersed throughout ink

**PARTICLES:**
- Viscosity: 1.0-1,000 cP at ambient temperature, or by heating the ink (ink dependent)
- Shear behavior: shear thinning or Newtonian – preferred; shear thickening - unacceptable

### SUPPORTED MATERIALS:

- Pure liquids or solvents
- Solutions
- Dispersions
- See next page for Aerosol Jet printed material listings

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**Optomec Inc.**
3911 Singer Blvd. NE
Albuquerque, NM 87109 USA

Tel: 505-761-8250
Fax: 505-761-6638
E-mail: sales@optomec.com

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### ABOUT OPTOMEC

OPTOMEC is a privately-held, rapidly growing supplier of Additive Manufacturing systems. OPTOMEC's patented Aerosol Jet Systems for printed electronics and LENS 3D Printers for metal components are used by industry to reduce product cost and improve performance. Together, these unique printing solutions work with the broadest spectrum of functional materials, ranging from electronic inks to structural metals and even biological matter. OPTOMEC has more than 200 marquee customers around the world, targeting production applications in the Electronics, Energy, Life Sciences and Aerospace industries. For more information about OPTOMEC, visit http://optomec.com.

![OPTOMEC Logo](http://optomec.com)

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### Aerosol Jet Systems Material/Substrate Matrix

<table>
<thead>
<tr>
<th>METAL INKS</th>
<th>RESISTOR INKS</th>
<th>NON-METALLIC CONDUCTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANP (Ag)</td>
<td>Acheson (carbon)</td>
<td>Brewer Science (SWCNTs)</td>
</tr>
<tr>
<td>Applied Nanotech (Ag, Cu, Ni, Al)</td>
<td>Asahi (carbon)</td>
<td>Heraeus (PEDOT:PSS)</td>
</tr>
<tr>
<td>Clariant (Ag)</td>
<td>Dupont (carbon and ruthenate)</td>
<td>NanoIntegris (SWCNTs and MWCNTs)</td>
</tr>
<tr>
<td>Creative Materials (Ag and AgE)</td>
<td>Lord (carbon)</td>
<td>SouthWest Nanotechnologies (SWCNTs and MWCNTs)</td>
</tr>
<tr>
<td>Dupont (Ag)</td>
<td>Methode Development (carbon)</td>
<td></td>
</tr>
<tr>
<td>Henkel (Ag)</td>
<td></td>
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<tr>
<td>Intrinsic (Cu)</td>
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<td>Nova-Centrix (Ag and Cu)</td>
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</tr>
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<tr>
<td>UT Dots (Au, Ag, Pt)</td>
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<tr>
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<tr>
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</tr>
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</table>

<table>
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<tr>
<th>DIELECTRICS AND ADHESIVE</th>
<th>SEMICONDUCTORS</th>
<th>REACTIVE CHEMISTRIES, RESISTS, AND ETCHANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldrich (polyimide)</td>
<td>Aldrich (organic semiconductors)</td>
<td>Aldrich (general solvents, acids, and bases)</td>
</tr>
<tr>
<td>BASF (PVP)</td>
<td>Alfa (organic semiconductors)</td>
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</tr>
<tr>
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<td>Rohm &amp; Hass</td>
</tr>
<tr>
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<td>Cheap Tubes (SWCNTs)</td>
<td>Shipley (photo and etch resists)</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Microchem (SU-8)</td>
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<tr>
<td>Nazdar (opaque coating fluids) Norland (UV adhesives)</td>
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**METAL INKS**
- ANP (Ag)
- Applied Nanotech (Ag, Cu, Ni, Al)
- Clariant (Ag)
- Creative Materials (Ag and AgE)
- Dupont (Ag)
- Henkel (Ag)
- Intrinsic (Cu)
- Nova-Centrix (Ag and Cu)
- Paru (Ag)
- PV Nanocell (Ag and Cu)
- Resin Designs (AgE)
- UT Dots (Au, Ag, Pt)
- Sun Chemical (Ag)
- Xerox (Ag)

**RESISTOR INKS**
- Acheson (carbon)
- Asahi (carbon)
- Dupont (carbon and ruthenate)
- Lord (carbon)
- Methode Development (carbon)

**NON-METALLIC CONDUCTORS**
- Brewer Science (SWCNTs)
- Heraeus (PEDOT:PSS)
- NanoIntegris (SWCNTs and MWCNTs)
- SouthWest Nanotechnologies (SWCNTs and MWCNTs)

**DIELECTRICS AND ADHESIVE**
- Aldrich (polyimide)
- BASF (PVP)
- Dupont (Teflon AF)
- Gersteltec (SU-8)
- Henkel (adhesives)
- Loctite (adhesives)
- Mantech Materials (polyimide)
- Microchem (SU-8)
- Nazdar (opaque coating fluids)
- Norland (UV adhesives)
- Summers Optical (UV adhesive)
- Sun Chemical (UV acrylces)

**SEMICONDUCTORS**
- Aldrich (organic semiconductors)
- Alfa (organic semiconductors)
- Brewer Science (SWCNTs)
- Cheap Tubes (SWCNTs)
- Merck (organic semiconductors)
- NanoIntegris (SWCNTs)
- Southwest Nanotechnologies (SWCNTs)

**REACTIVE CHEMISTRIES, RESISTS, AND ETCHANTS**
- Aldrich (general solvents, acids, and bases)
- Alfa (general solvents, acids, and bases)
- Rohm & Hass
- Shipley (photo and etch resists)