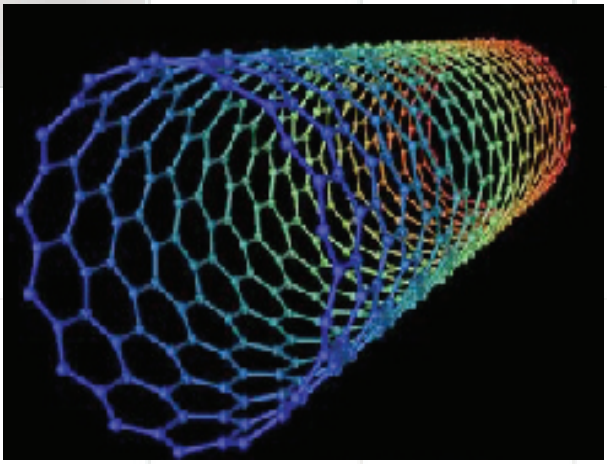
Aerosol Jet®

Materials FAQs

Materials for Aerosol Jet printing

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



Carbon Nanotube

- Minimum feature (line) size is very material and process dependent:
  - ~10µm wide features can be consistently printed on SiO2 (Silica) – FPD and semiconductor apps
- Maximum feature sizes are user controllable
  - 1.5 mm or greater using a wide nozzle print head
  - With multiple passes, features sizes are limited to the size of the underlying substrate
- Pitch (distance) between lines can be ~20 µm

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
- Rheology
  - 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

Appropriate Materials for Aerosol Jet systems:

- Pure liquids or solvents
- Solutions
- Dispersions
- See next page for detailed materials matrix

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Aerosol Jet®

Deposition System Materials Matrix

AEROSOL JET MATERIALS MATRIX	Polyester	Polyimide	Glass	C-Si	ITO	Metals
Conductor	UT Dots Ag UT Dots Au Nanomas Ag,Au Cabot Ag H.C. Stark PEDOT:PSS Brewer Science CNT	UT Dots Au CIMA Nanotech Cabot Ag H.C. Stark PEDOT:PSS Applied Nanotech Cu Brewer Science CNT	Cabot Ag H.C. Stark PEDOT:PSS Applied Nanotech Cu Brewer Science CNTRENE H.C. Stark PDOT:PSS BayInk TPS-HS	Cabot CSD-30 Cabot CSD-74 DuPont Five Star ElectroSperse	UT Dots Ag UT Dots Au Cabot Ag NanoMas Ag H.C. Stark PEDOT:PSS	UT Dots Ag UT Dots Au NanoMas Ag Cabot Ag H.C. Stark PEDOT:PSS
Resistor	Asahi FTU series	Asahi TU series Brewer Science SWCNT Acheson M-2031-pol Lord Metech PC11223	Asahi TU series Brewer Science SWCNT Acheson M-2031-pol Lord Metech PC11223			Asahi TU series
Dielectric Adhesive	Loctite 3492 Norland 65 (various others) SU-8 GM1010 Aldrich Polyimide (various) Dupont Teflon AF BASF Luvitec PVP Ablestik	Loctite 3492 Norland 65 (various others) Dupont Teflon AF BASF Luvitec PVP	Norland 65 (various others) SU-8 GM1010 Summers Optical Asahi CX-16 Dupont Teflon dispersion BASF Luvitec PVP SUN Chemical 97B SUN Chemical 106B CA 1000		Norland 65 (various others) Summers BASF Luvitec PVP SUN Chemical 97B SUN Chemical 106B CA 1000	Norland 65 (various others) Loctite SU-8 GM1010 Dupont Teflon AF BASF Luvitec PVP
Biological			water based solvent based PLGA 5%			water based solvent based PLGA 5%
Etch Resists Catalysts Etch Chemicals				Rohm & Haas Enlight	Nazdar RS10-26	SU-8 GM1010 Acids (various)
Semiconductor	Merck P3HT Brewer Science SWCNT NanoIntegris SWCNT	Merck P3HT Brewer Science SWCNT NanoIntegris SWCNT	Merck P3HT Brewer Science SWCNT NanoIntegris SWCNT	Rohm & Haas Enlight		SU-8 GM1010 Acids (various)