Nanotech Energy

Screen Printing **Graphene Inks**

High Quality Graphene Inks for a Variety of Applications

Nanotech Energy provides a highly conductive, cost-effective and environmentally friendly custom-made graphene inks.

Graphene Ink with High Conductivity

Fast Drying, Eco-Friendly and Chemically Stable

Good for Printed, Flexible Electronics

Water & Solvent Based Inks

Large Quantities Available

NANOTECH ENERGY

12100 Wilshire Blvd. | Suite 800
Los Angeles, CA 90025

1 (310) 806-9202
nanotechenergy.com

Why Graphene Ink?

WORLD'S FIRST

Nanotech Energy owns what can arguably be considered the world's first graphene patent filed in May of 2002. Nobel Prize winning researchers Sir Andre Geim and Konstantin Novoselov first work on graphene was published two years later. Since 2002, Nanotech Energy has staked its claims on 28 patients in graphene production, processing, applications and much more.

HIGHEST SURFACE AREA OF ANY GRAPHENE IN THE MARKET

Graphene offers impressive combination of high strength, chemical stability and excellent conductivity. We are currently producing graphene via rapid and environmentally friendly methods, which represents a key to low-cost manufacturing of flexible and printed electronics, composites and novel energy solutions. We also offer two forms of graphene whose electronic conductivity has been optimized to meet the needs of our customers. With over 2000 m^2/g, Nanotech Energy offers graphene with the world's largest specific surface area of any commercial graphene. As a result, this graphene shows potential to transform the industry of printed electronics enabling devices such as solar cells, flexible displays, thin film transistors, photodectors, supercapacitors, batteries, sensors, etc.

	HG	PG
Material	Graphene, Process H	Graphene, Process P
Surface area* (m^2/g)	2519	2057
Conductivity (S/m)	1047	3615
Sheet size	Adjustable (0.1 to 10 μm)	Adjustable (0.1 to 10 μm)

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Screen Printable Graphene Inks: Nanoink-SPHG series

Screen printable graphene inks based on proprietary carbon nano composites designed and produced by Nanotech Energy.

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PRODUCT FEATURES:

- High electronic conductivity at low cost
- Water and solvent based inks
- Customization available
- Large quantities
- High solid content
- Low curing temperatures

	NANOINK-SPHG-W50	NANOINK-SPHG-N50
Chemistry	**Graphene-based**	**Graphene-based**
Solvent	**Water**	**N-methylpyrrolidone**
Viscosity (cps)	**1340 cps@6rpm**	**2900 cps@6rpm**
Sheet resistance (Ω/□/mil)	≤ 32	≤ 32
Conductivity (S/cm)	≥ 12.5	≥ 12.5
Particle size distribution (µm)	<1 µ	<1 µ
Solid content (w/w)%	5.73%	9.3%
Applications	Screen, slot-die, flexographic & gravure printing	Screen, slot-die, flexographic & gravure printing
Quantity	50 mL	50 mL
Curing conditions	RT for 30 min Rapid curing 80°C for 10 min	RT for 30 min Rapid curing 80°C for 40 min 110°C for 10 min

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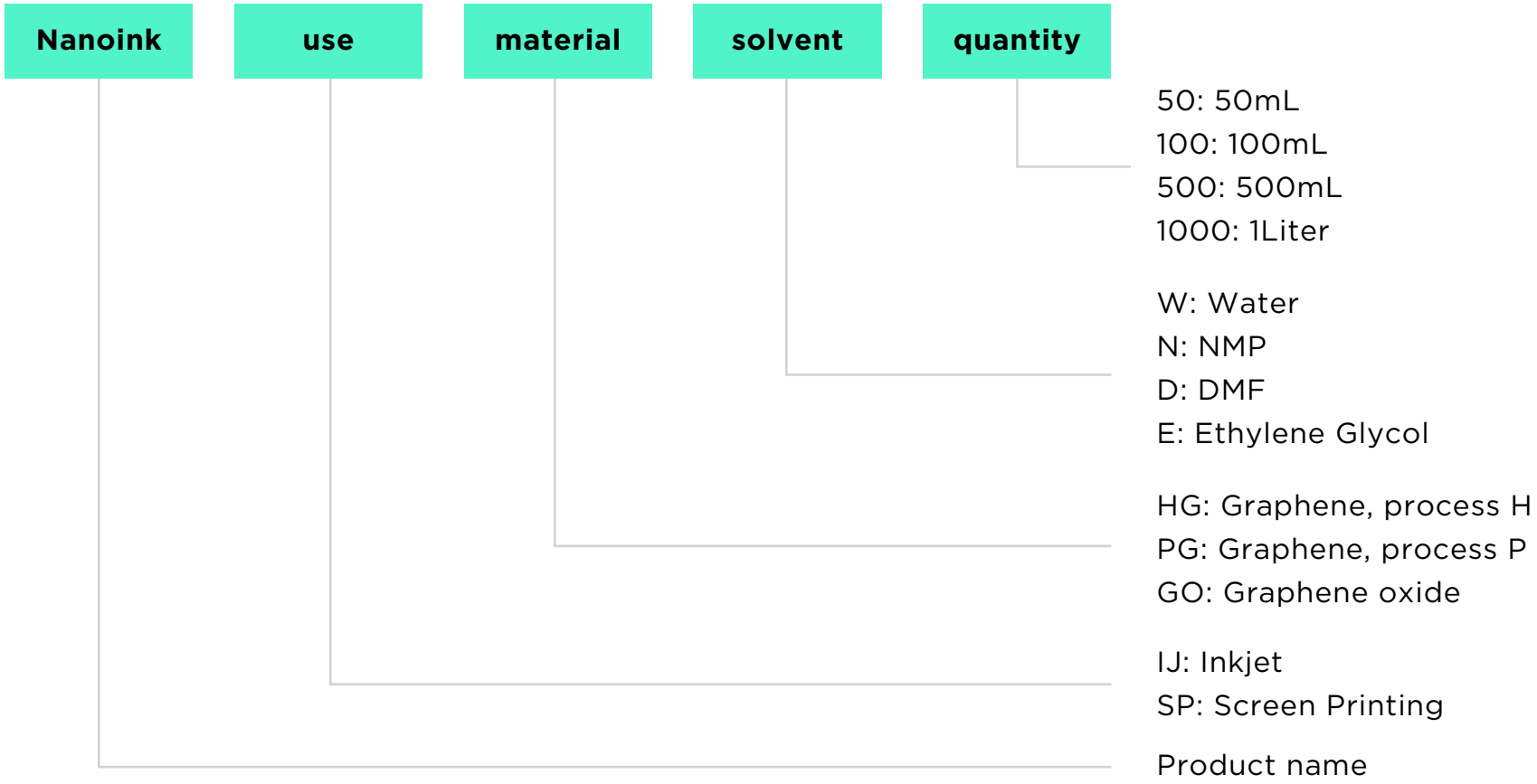
Product Code SKU Reader

Nanotech Energy offers conductive inks with several formulations enabling the users to define the ink best for their application. The chart below allows our customers to read the composition of our conductive inks based on the application method, type of the conductive material, the solvent and the amount of the ink.

SAMPLE PRODUCT NAMES ARE: Nanoink-SPGO-W50 | Nanoink-IJHG-D50



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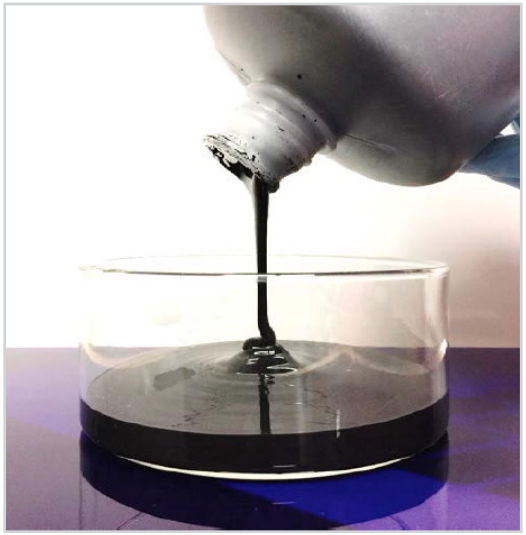
Product Code SKU Reader

Product Data

DATA	MEASUREMENT	UNIT
Visual	Black	NA
Appearance	Thick liquid	NA
Viscosity	2300-2400	mPa.s (cps)
Density	1.01 @ 20ºC	g/cm^3
Solid content	5.5	(w/w)%



Electrical Properties of Coated Films

	MEASUREMENT	NOTES
Sheet resistance	Sheet resistance	Measured with 2 point probe at dry coating thickness of 14.4 um
Mechanical Properties-Compression	Mechanical Properties-Compression	By creasing at 180 degrees (2 mm bend radius) and straightening the film back to the original flat state, only ~0.1% change in resistance was observed.
Tension	Tension	Crease at 180 degrees (1.75 mm bend radius) causes +0.74% increase in resistance
Stability of Films	Stability of Films	Measured by bending the films (compression) back and forth at 10 mm radius for 1000 cycles
Curing conditions	Curing conditions	Takes 3-5 minutes

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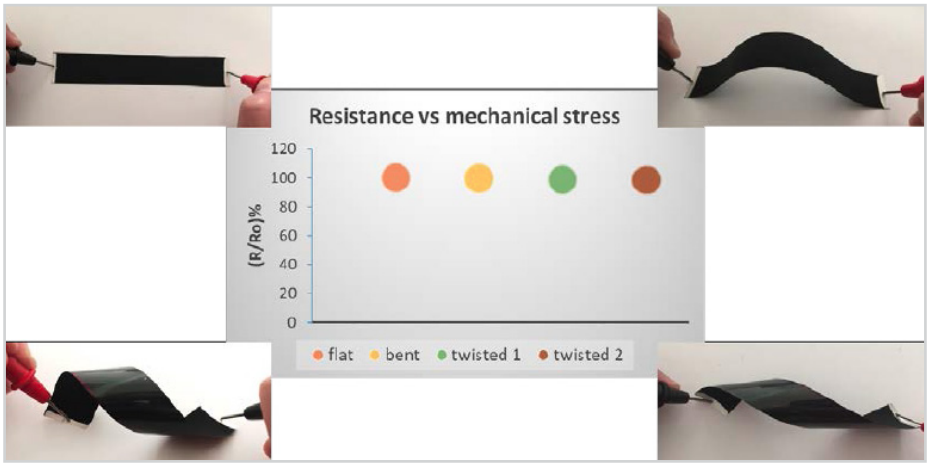
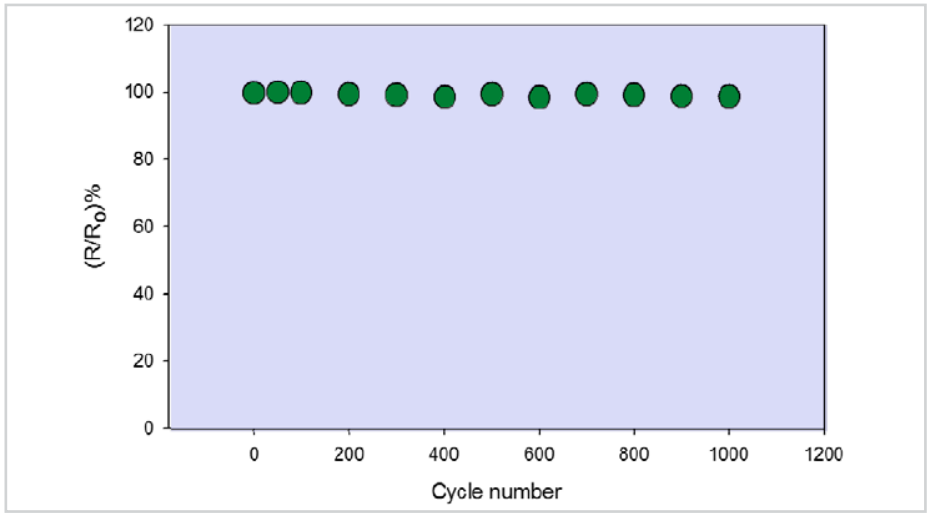
Mechanical Properties of the Dry Films

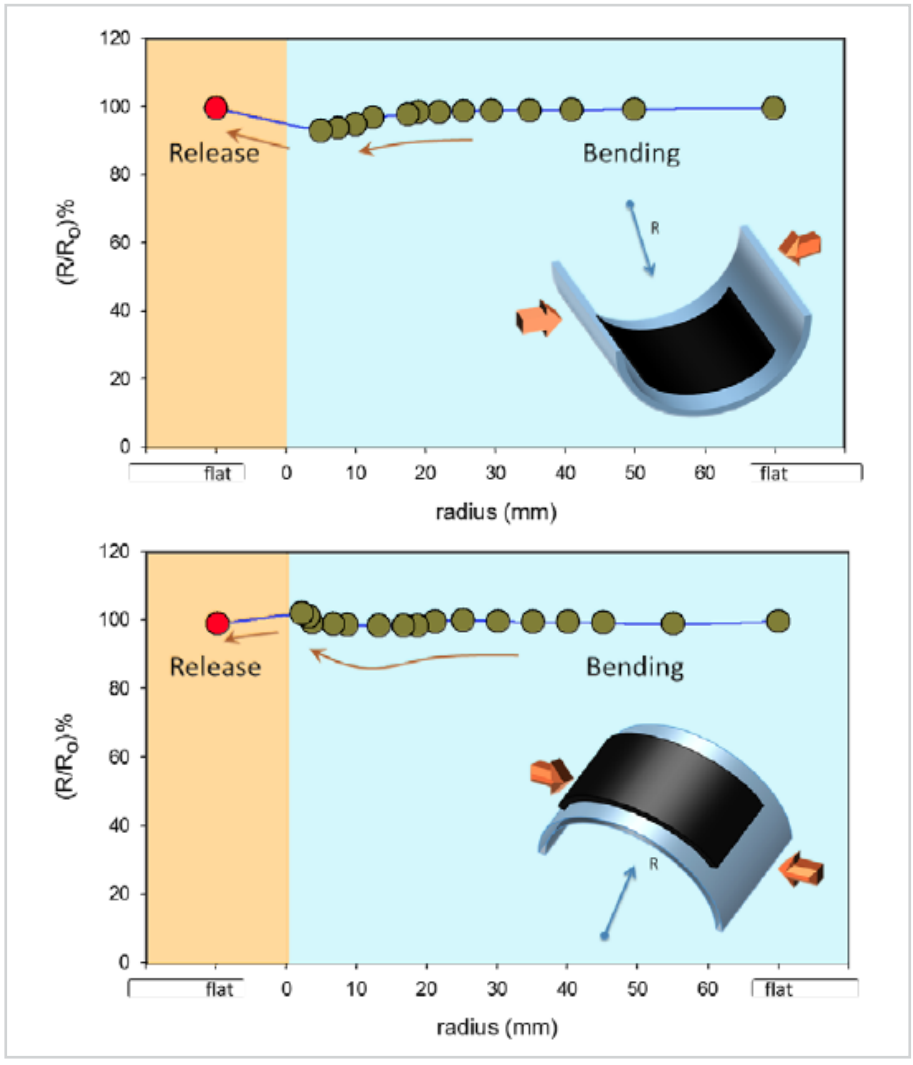
Our graphene ink can be coated onto films showing very stable sheet resistance against bending and twisting



Excellent Mechanical Stability for over 1000 Bending Cycles



While there is a slight change in resistance under extreme bending (radius of curvature = 1.75 mm), the change is completely reversible.



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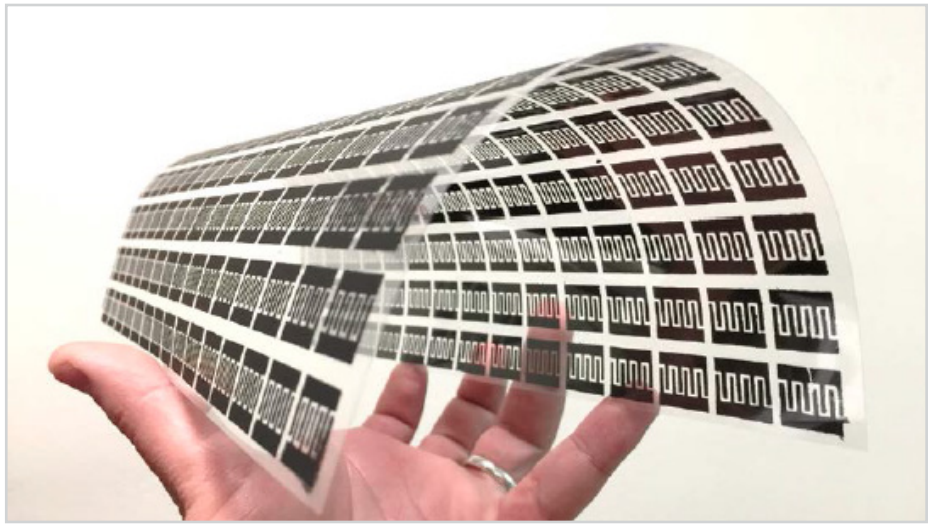
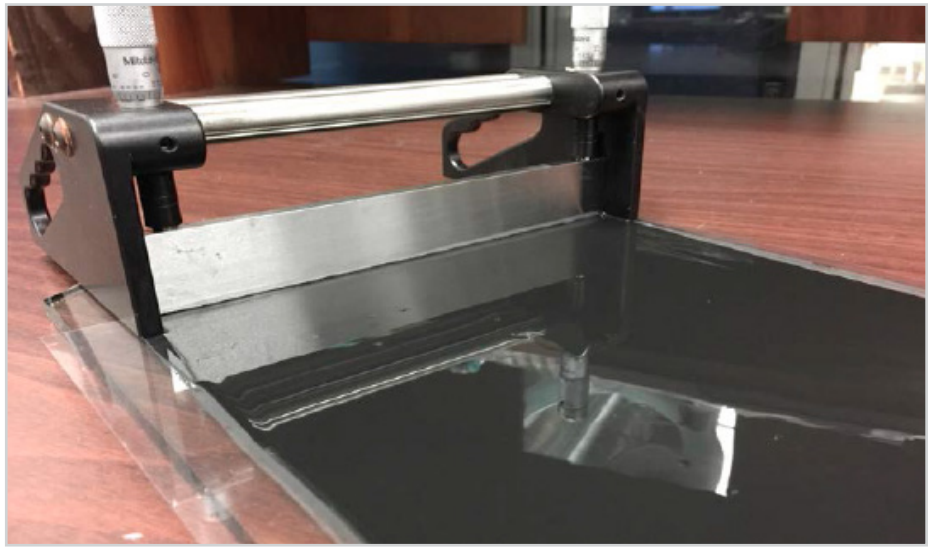
Screen Printing of Functional Devices



Application of the ink

Ink can be processed into large area films on rigid and flexible substrates using different coating techniques. The films demonstrate excellent electrical and mechanical properties for use in electromagnetic shielding, resistive heating, sensors, energy storage and conversion devices, among others.



Screen Printing of Supercapacitor and Battery Electrodes

The electrodes are flexible, foldable and twistable and can be used directly as super capacitors electrodes. Another interesting application for these electrodes is in lithium ion batteries where they can be utilized as the battery anodes or current collectors.

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Screen Printing of Functional Devices

Screen Printable Graphene Ink Standard Packaging

- 50 mL
- 100 mL
- 500 mL
- 1000 mL

Large Volumes Available Upon Request

For Orders, Pricing or Technical Assistance, Please Contact Nanotech Energy at info@nanotechenergy.com

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