Graphite & Graphene

1.) Graphite
2.) Graphite Oxide
3.) Graphene
4.) Graphene Nanoplatelets
5.) Graphene Oxide
6.) Graphene Dispersion
7.) Glassy Carbon

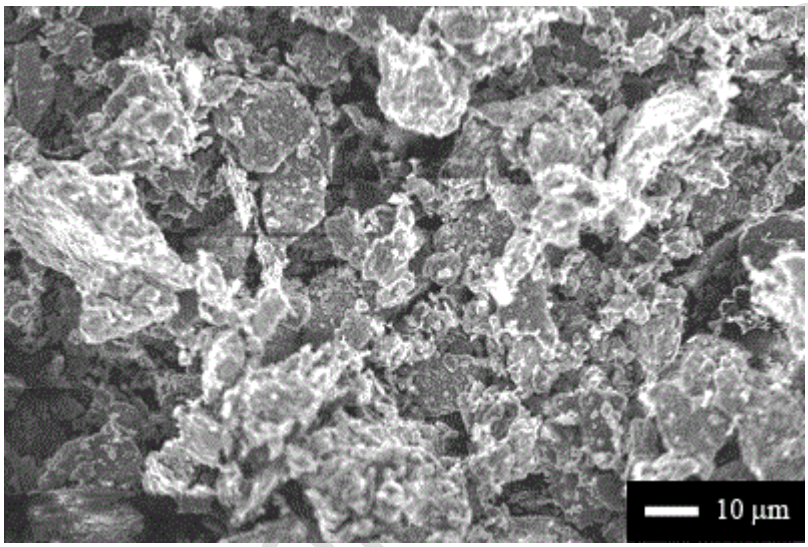
Graphite

1. Amorphous Graphite - 100 Grams

Microcrystalline graphite is widely known as Amorphous Graphite. The utility grade of graphite powder is used for various applications where graphite is required; it is commonly used for general maintenance. It is usually formed by the thermal metamorphism of coal.

Properties:

325 Mesh (44 Microns or more in lateral size)
Carbon content: 80% or more



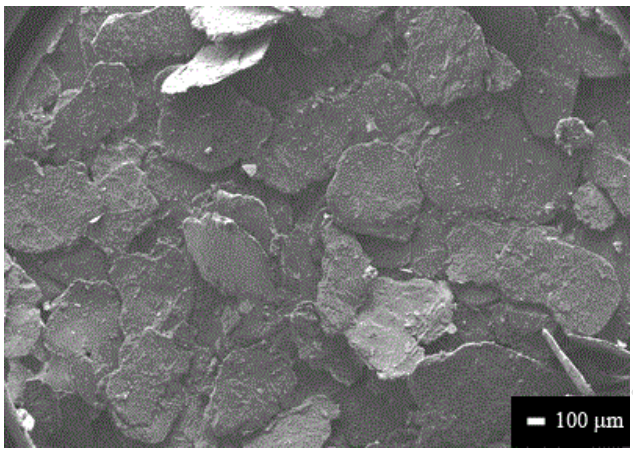
2. Flake Graphite: 100 grams

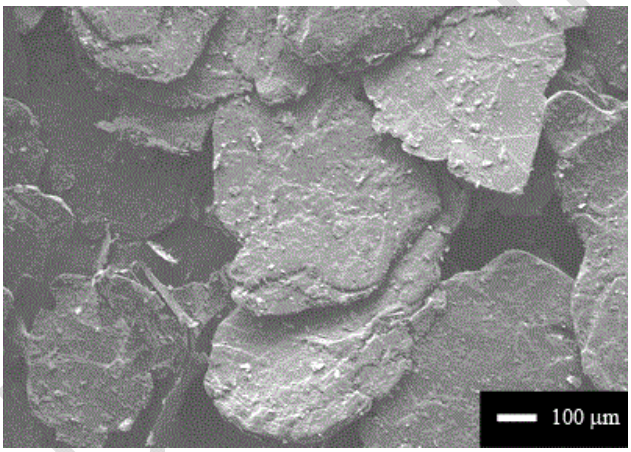
As the name implies, flake graphite has a distinctly flaky or platy morphology.

Graphite is formed when pure carbon atoms link together to form flat sheets, which manifest themselves as large visible flakes or coarsely crystalline graphite.

Properties:

+100 mesh (150 microns or more in lateral size)
Purity 99.9%



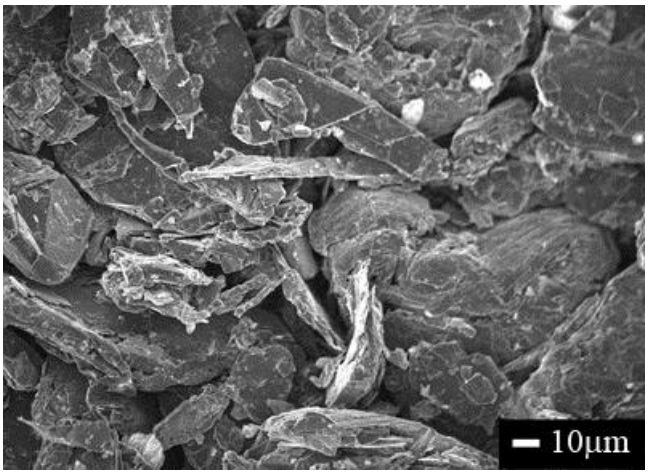


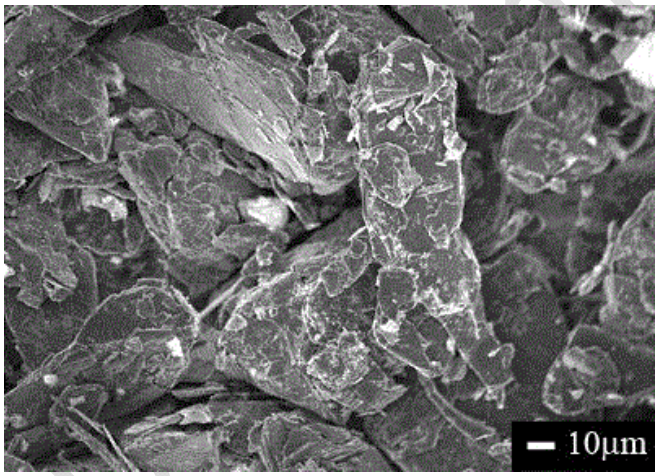
3. High Crystalline Natural Graphite: 10 grams

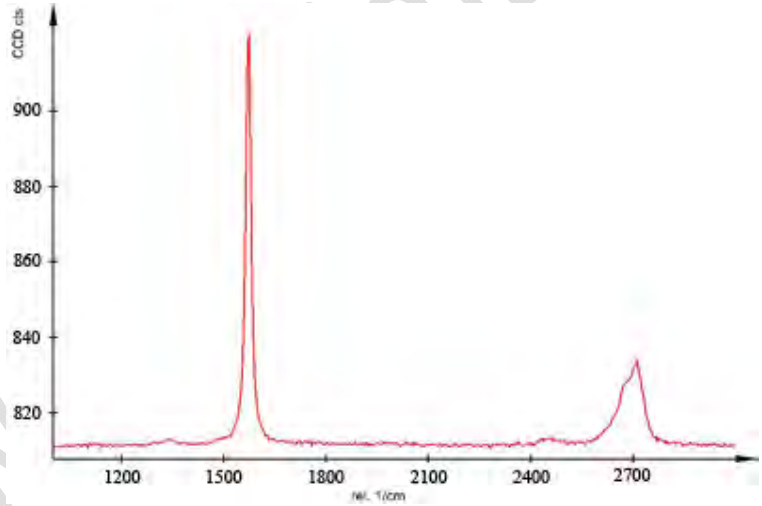
Properties:

- Ultrapure: Carbon content is >99.75%
- Lateral Dimensions: 10-75 microns

Nearly perfect crystal structure
This material is perfect for many applications which utilize graphene synthesis from graphite. It is generally more affordable than kish graphite for graphene-related applications.







Applications:

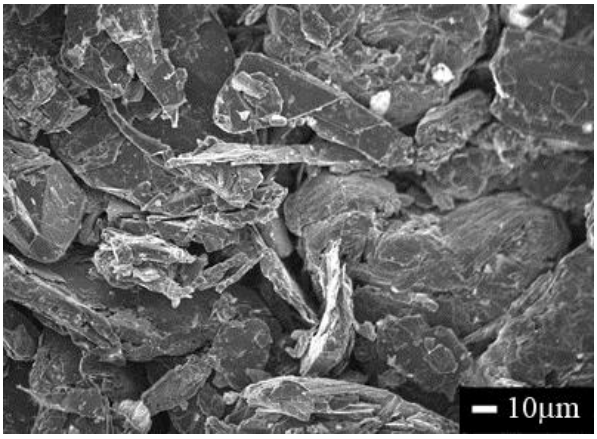
- Composite Materials
- Electrically and Thermally Conductive Composites
- Conductive Coatings
- Aerospace Industry
- Fire Retardants
- Support for Metallic Catalysts
- Low Permeability Materials
- Electro-static Dissipation (ESD) Films
- Chemical and Bio Sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

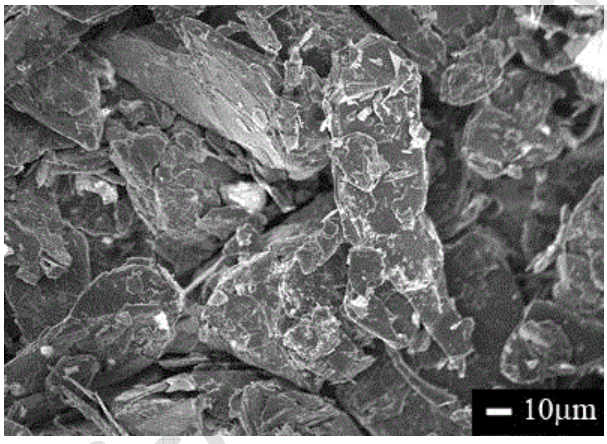
4. High Crystalline Natural Graphite: 25 grams

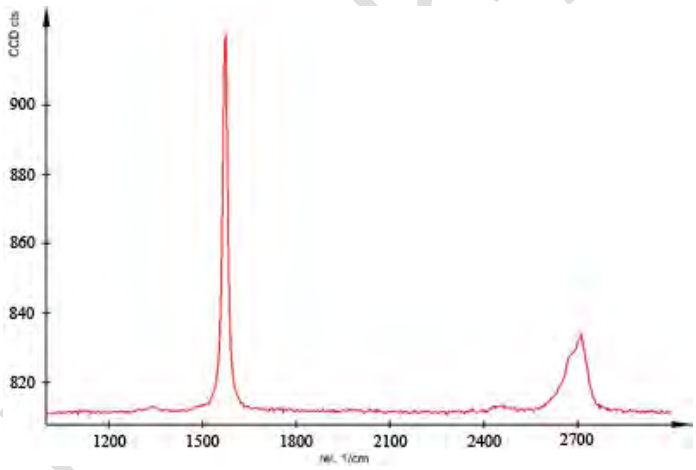
Properties:

- Ultrapure: Carbon content is >99.75%
- Lateral Dimensions: 10-75 microns

Nearly perfect crystal structure
This material is perfect for many applications which utilize graphene synthesis from graphite. It is generally more affordable than kish graphite for this purpose.







Applications:

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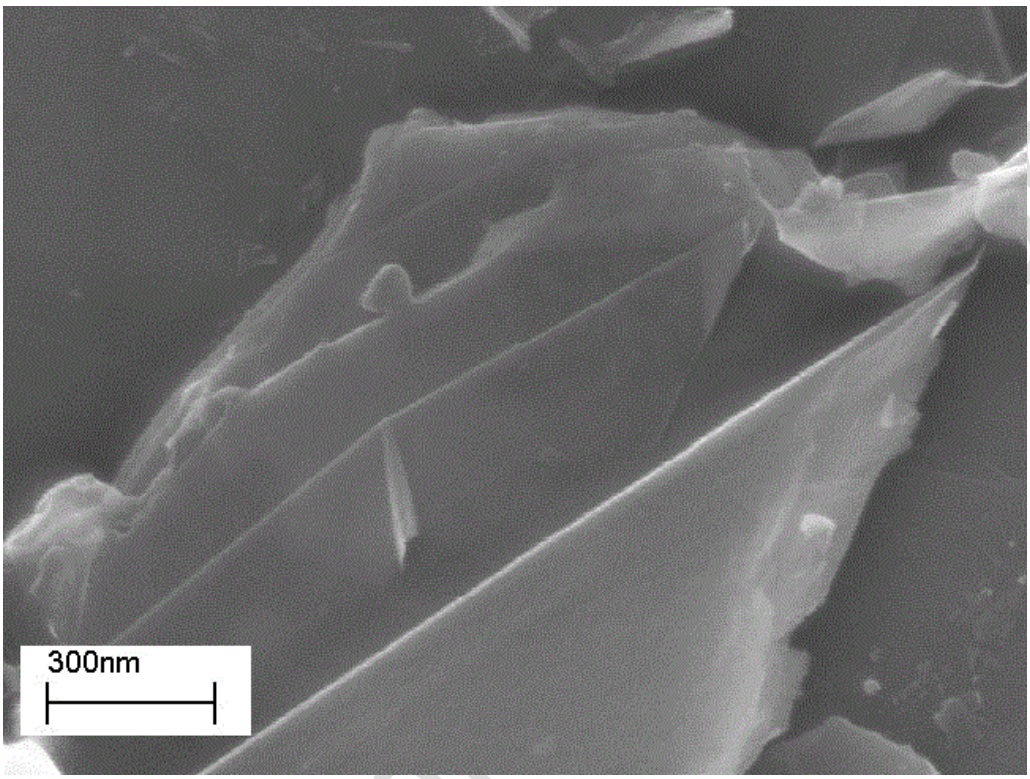
5. Natural Kish Graphite (Grade 200), 5g

Kish Graphite: 5 gram

Ultrapure: Carbon>99.2%, Moisture<0.35%

Grade 200 Flake size: 0.7-2 mm



Perfect inexpensive starting material for synthesis of:

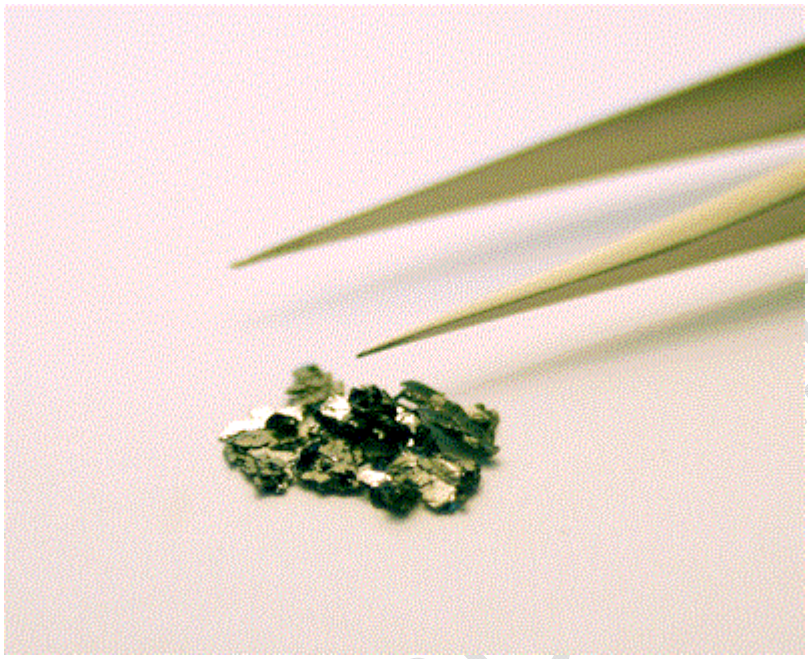
- Graphene Intercalation Compounds
- Graphene Oxide
- Graphene Flakes prepared by sonication assisted dispersion.
- Graphene hybrid materials

Grade 200 Kish graphite works well for making Scotch Tape graphene.

6. Natural Kish Graphite (Grade 300), 0.2 g

Kish Graphite: 0.2 gram

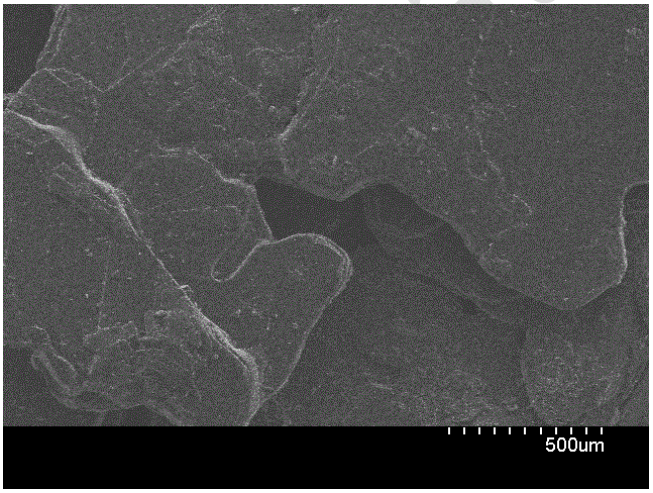
Grade 300

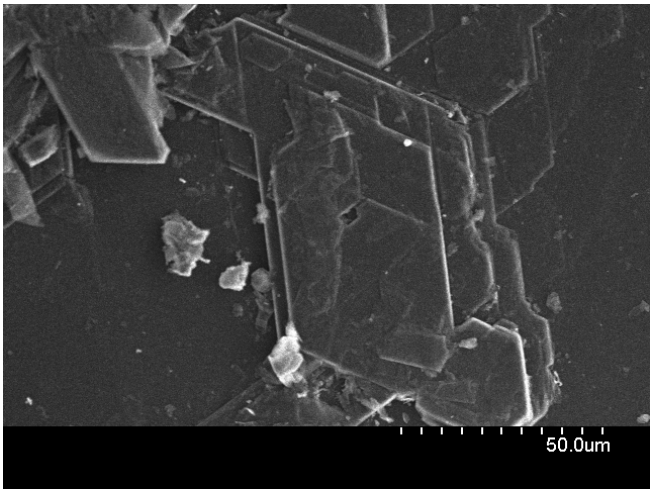


Ultrapure: Carbon>99%

Large Flakes: size 1-3 mm

Kish graphite is used by hundreds of research groups to make graphene by mechanical exfoiliation. (a.k.a. "Scotch tape method pioneered by Novoselov and Geim") Perfect for making "Scotch Tape" graphene!





7. Natural Kish Graphite (Grade 300), 0.5 g

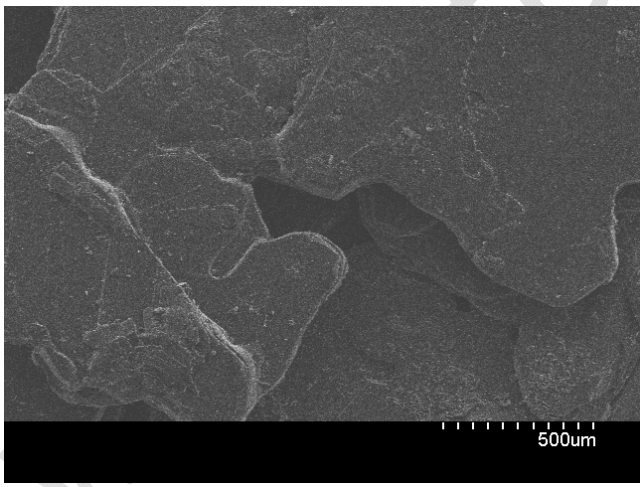
Kish Graphite: 0.5 gram

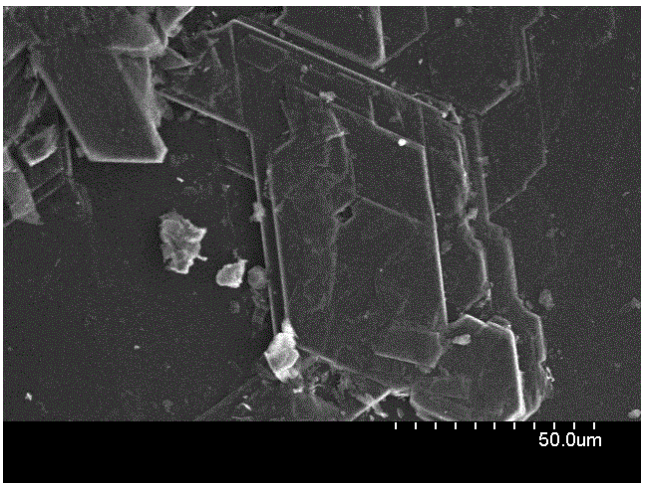
Grade 300

Ultrapure: Carbon>99%

Large Flakes: size 1-3 mm

Kish graphite is used by hundreds of research groups to make graphene by mechanical exfoiliation. (a.k.a. "Scotch tape method pioneered by Novoselov and Geim") Perfect for making "Scotch Tape" graphene!





8. Carbon Nanohorns: 0.25 grams

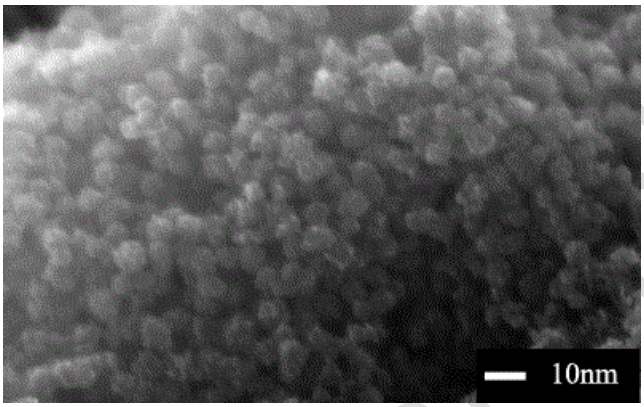
Carbon Nanohorns are made of graphene sheets which are wrapped and form cone shapes. One end of the cone is capped similar to a fullerene. Each cone is 30-50 nm in length and 2-5 nm in diameter. These cones tend to group together and form a cluster which can be characterized as nano-stars or nanohorns.

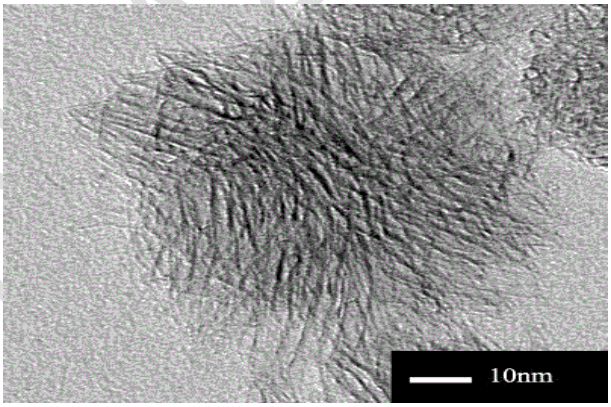
Carbon Nanohorns have many of the same properties as graphene – high electrical and thermal conductivity, as well as ease of functionalization.

This product is in the form of powder and comes in the size of 0.25 grams

Properties:

- Diameter: 3-5 nm
- Length: 30-50 nm
- Cluster diameter: 60-120 nm
- Density: 1.1 g/cm3
- Bulk density: >15 g/dm3
- Active surface: 250 m2/g





Applications:

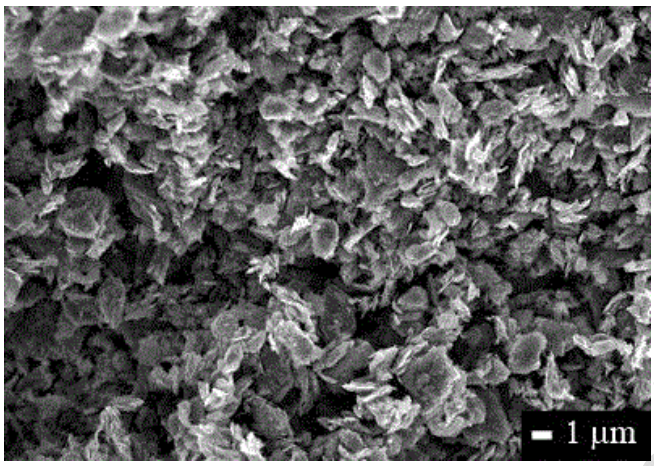
- Composite materials
- Energy storage and Li-ion batteries
- Field Emission Display's
- Gas storage
- Drug delivery

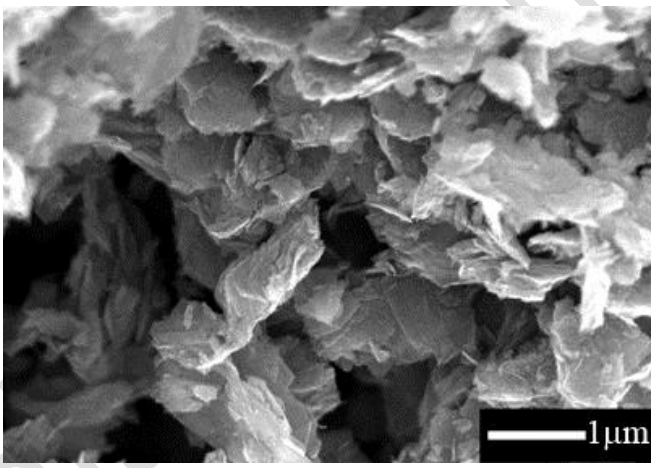
9. Nanostructured Graphite-250

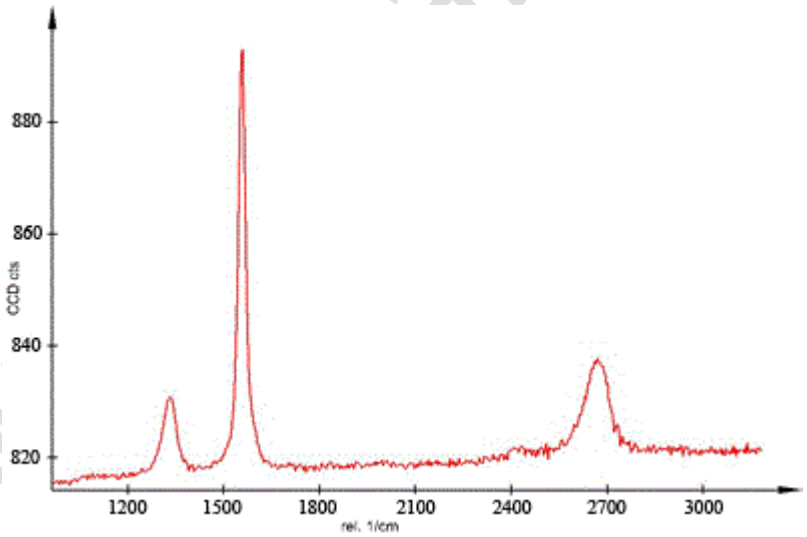
Properties:

- Specific Surface Area: 250 m2/g
- Lateral Size: 100 nm-500 nm
- Thickness: 10-300 nm

25 Grams
Ultrafine Natural Nanographite is a high surface area material, produced by splitting of natural graphite. There is no oxidation or use of surfactants.







Applications:

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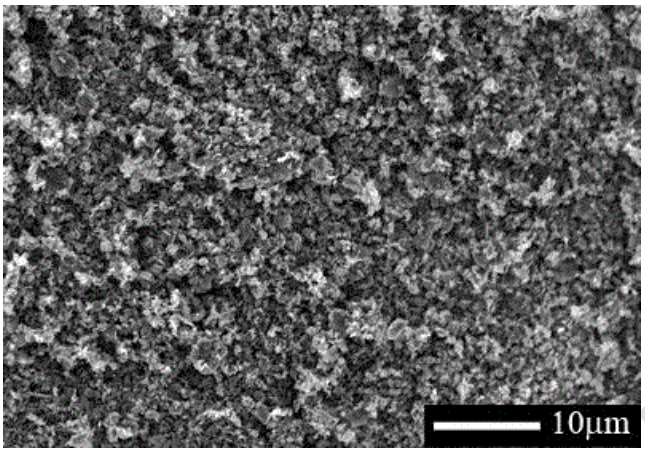
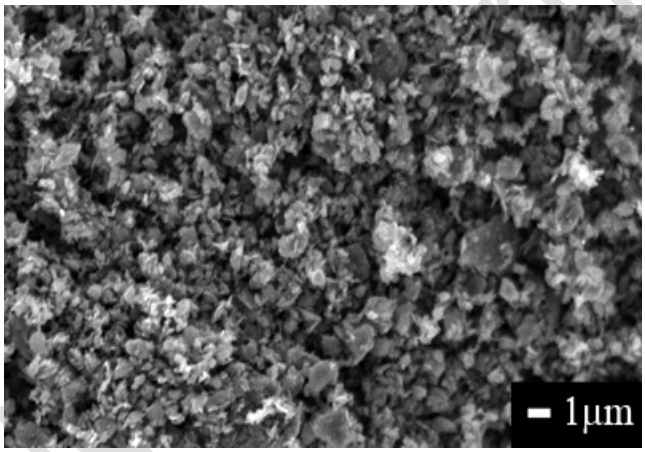
- Multifunctional Materials Based on Graphene
- Graphene Research

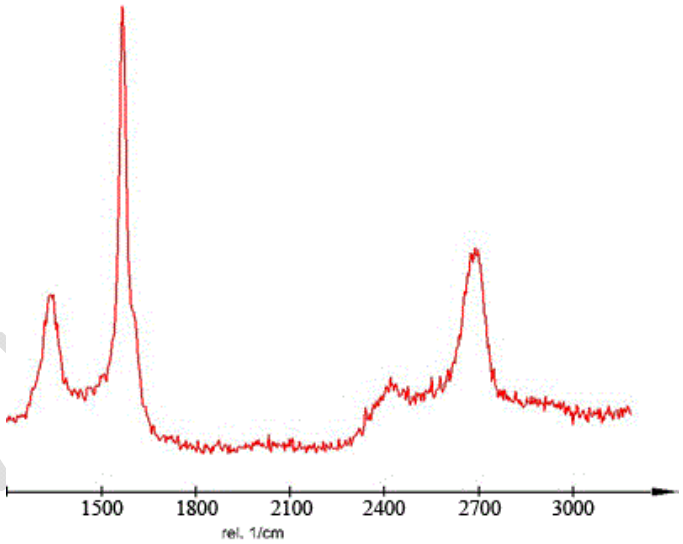
10. Nanostructured Graphite-400

Properties:

- Specific Surface Area: 400 m2/g
- Lateral Size: 100 nm-500 nm
- Thickness: 10-300 nm
- 25 Grams
- Ultrafine Natural Nanographite is a high surface area material, produced by splitting of natural graphite. There is no oxidation or use of surfactants.







Applications:

- Composite Materials
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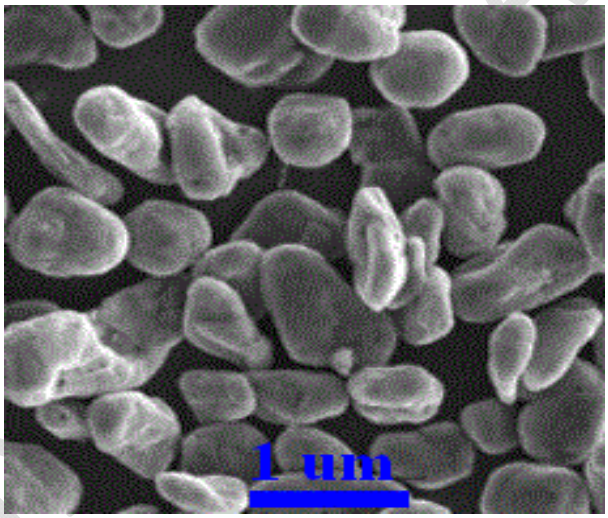
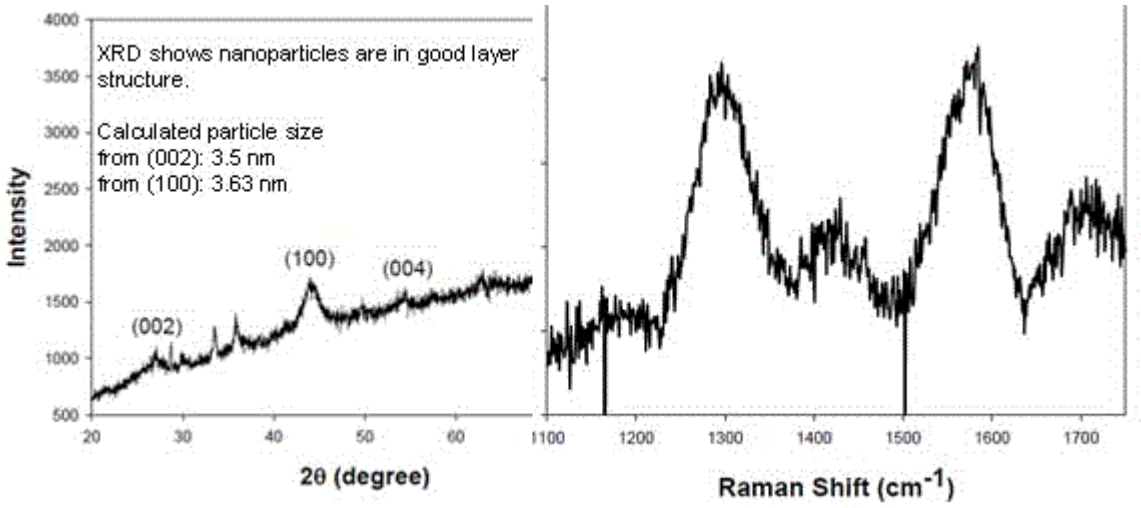
11. Graphite (C) Nanopowder / Nanoparticles (C, 400nm - 1.2 um, 99.9%, Natural Graphite, Hydrophobic)

Purity: 99.9% (metal base)
APS: 400nm-1.2um
PH = 6-7
Fixed Carbon: 99+%
Ash: <0.5%
Impurities: (quartz + mica) < 0.1%, H2O~0.2%
Morphology: flaky
Color: black

Graphite Nanopowder / Nanoparticles Applications:
Natural graphite is mostly consumed for refractories, steelmaking, expanded graphite, brake linings, foundry facings and lubricants; Natural graphite has found uses as the marking material ("lead") in common pencils, in zinc-carbon batteries, in electric motor brushes, and various specialized applications. Aluminum/graphite composites for bearings, pistons, and liners in engines; Carbon adsorbents for gas chromatography;Cupper/graphite and silver/graphite nanocomposites for electrical brushes and contact strips; Inorganic filler (graphite/polymer nanocomposites); Support materials for precision metal powder catalysts Graphite/polymer nanocomposites for enhanced electrical conductivity; Metal matrix composites for reduced friction and wear…



12. Graphite Nanoparticles



Graphite (C, Hexagonal)
Explosion Synthesized

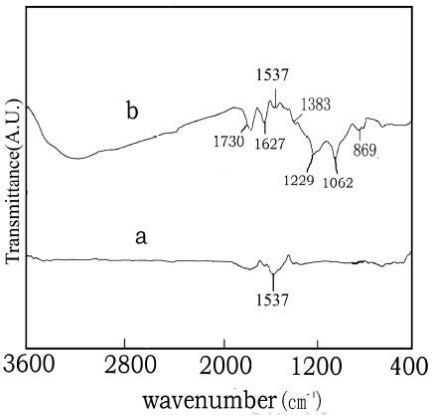
- Appearance: Black nanopowder
- APS: 3 - 4 nm
- SSA: 540-650 m2/g
- Oxidization temperature: 710 K
- Morphology: spherical
- True density: 1.2-2.8 g/cm3

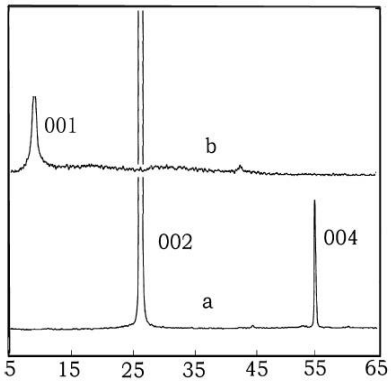
13. Graphite Powder

Graphite (C, natural flake)
Appearance: Black powder
D50: 1 um
Fixed Carbon: 99+%
Ash:<1%
Morphology: flake

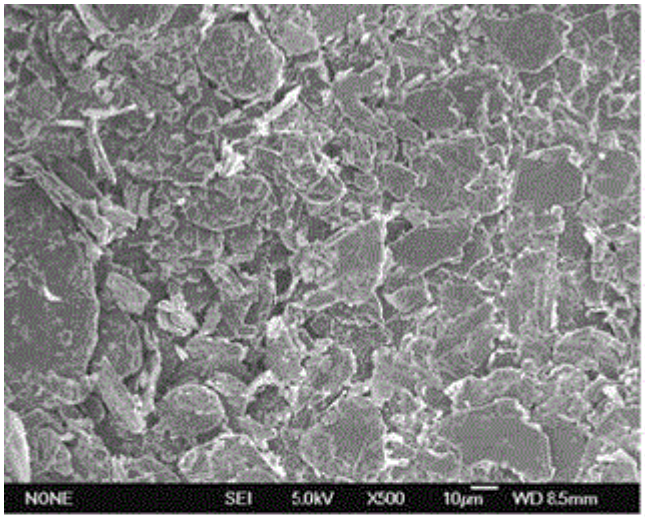
14. Graphite Oxide

Preparation Method: Modified HUMMER'S method

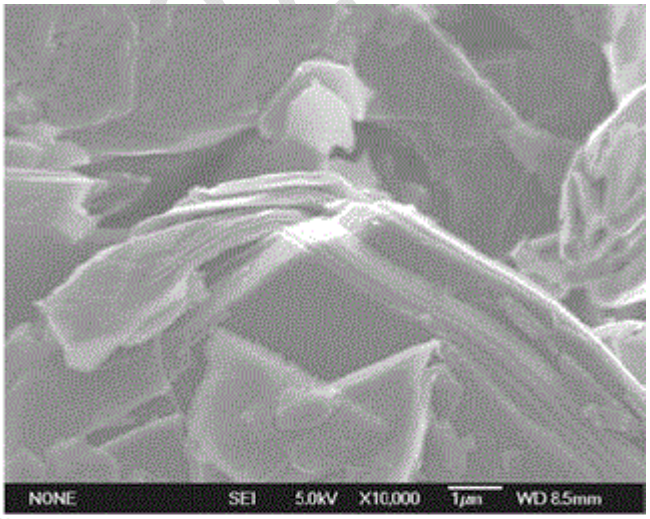




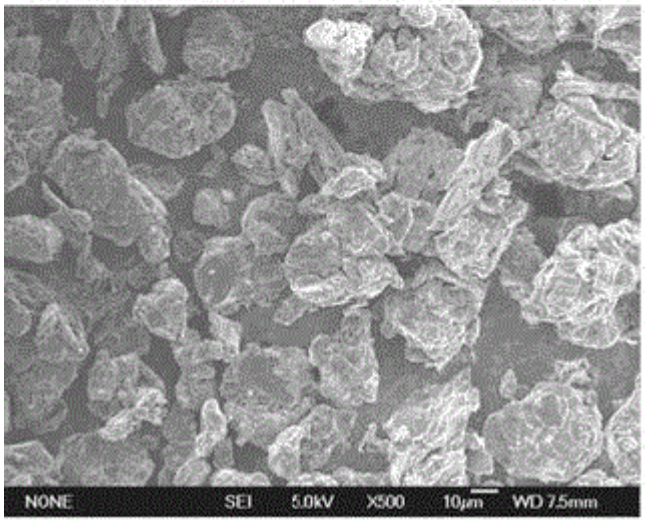
FT-IR for graphite (a) and graphite oxide (b) XRD for graphite (a) and graphite oxide (b)



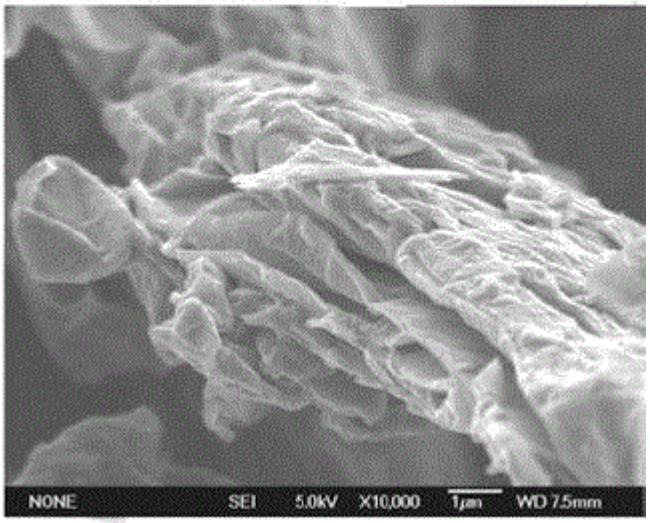
(a)



(b)



(c)



(d)

TEM for graphite (a, b) and graphite oxide (c, d)

Graphite Oxide has good solubility in water, ethanol, DMF et al. The dispersion concentration of Graphite Oxide in water will be greater than 2 mg/ml. Graphite Oxide can be easily dispersed in polar solvents with the help of ultrasound.

Application Fields:

- Preparation of graphene;
- Solar energy;
- Graphene semiconductor chips;
- Conductive graphene film;
- Graphene computer memory;
- Biomaterials;
- Transparent conductive coatings.

15. Graphite Fluoride (Carbon Monofluoride)

Graphite Fluoride, also called polycarbon monofluoride, polycarbon fluoride, and Carbon Monofluoride, is a material formed by high-temperature reaction of fluorine gas with graphite, charcoal, or pyrolytic carbon powder. Our product is 99+% pure Carbon and Fluorine.

Cas No.	51311-17-2
wt. % F	56-61
Color	Grey/White
Density (g/cm^3)	2.5
Size (μm)	1~10
Electrical Resistivity (Ω·m)	$\sim 10^{11}$
Friction Factor	<0.14
Surface energy (Mj/m2)	7.01
F/C Ratio	0.8~1.1
D90 (μm)	8

Graphite Fluoride can be used in a variety of fields, including:

1) High energy density cathode material in lithium batteries.
2) Reduction additive for lubricants.
3) Weather-resistant additive for paints.
4) Oxidizing agent and combustion modifier in rocket propellants and pyrolants.

16. Expanded Graphite

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
01	/	/	/	/	32~150	/	/	85~99	/

Application:

Being widely used as essential industrial mineral material in almost all industries: being used as lubricant for high speed running machine in mechanic industry; being used as neutron moderator and protection material in nuclear power industry; it can be used as jetting liner for rocket rear spout and as heat insulation and refractory material in aerospace industry.

Features:

Expandable graphite has favorable expandable. It has a high temperature resistance, radiation resistance, adiabatic, self-lubricity, plasticity and chemical stability.

17. Amorphous Graphite

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
AMG01	/	/	/	/	0~30	/	/	80~99	500~800

Application:

Widely applied to high quality fire resistance material and coating of metallurgy industry, hot working material stabilizer of military industry, lead of light industry, carbon brush of electrical industry, electrode of battery industry, and catalyzer and additive of fertilizer industry. After further process, scale graphite can be made into the following high-tech products such as graphite colloidal graphite, graphite compacting material and composite material, graphite products, and graphite anti-friction additive, which are becoming important nonmetal mineral materials in every industry.

Features:

Scale is thin, flexible and crystallized completely with excellent physical and chemical properties such as good temperature resistance, self-lubrication, conductibility, heat resistance.

18. Natural Flake Graphite

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
NFG01	/	/	/	/	20	/	/	90~92	800

Application:

Widely used in the senior refractory materials and coatings in metallurgical industry, lead of light, electrical industrial carbon brushes the electrode of the battery industry, fertilizer industry catalyst additives.

The flake graphite after deep processing, but also produce milk graphite, graphite sealing materials and composite materials, graphite products, graphite friction reducing additives and other high-tech products become important non-metallic mineral raw materials in various industrial sectors. Also used in the friction material.

Features:

Flake crystalline integrity, and thin slices of good toughness, excellent physical and chemical properties, good temperature resistance, self-lubricating, conductivity, thermal shock resistance, corrosion resistance performance.

19. Graphite Carburant

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	Ppm
GC01	0.8~1.9	/	70~110	35	/	8~10	/	99	/

Features:

It has chemical stability, and it is not affected by strong acid and alkali, less harmful impurities, iron sulfur content is low, high temperature resistance, which is widely used in casting, TuMo, battery, carbon products, pencil, and paint, refractory materials.

20. Metal Impregnated Graphite

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
MIG01	1.75~1.85	9	60~72	42~49	0.043	/	/	/	0.1~0.2

Application:

For high vacuum furnace, mechanical industry, chemical industry, ceramic industry, etc.

Features:

High purity, fine grain, good performance of electrical conductivity and thermal conductivity, high density, good corrosion resistance, thermal shock resistance, thermal stability, high mechanical strength, low permeability, chemical stability. Small coefficient of thermal expansion, etc.

21. Resin Impregnated Graphite

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
RIG01	1.75~1.85	9	60~72	42~49	0.043	/	/	/	0.1~0.2

Application:

1. Impregnating graphite carbon fiber product (carbon rod with impregnated)

2. Impregnating various poriferous materials, such as woods, graphite, ceramic, asbestos etc.

3. Process to manufacture reinforced plastics of glass fiber, laminated board and insulating paint for electrical equipment etc. This kind(carbon rod with impregnated) of laminated board could be used as anti-corrosion pipeline, car brake pad and fire proof material with a very high strength in the condition of curing.

Features:

1. Good character of acid-base resistance, high temperature resistance and electric insulation

2. The curing process is conducted at ambient temperature

3. High strength after curing process

4. Small surface tension, low viscosity, high cooking value

22. Anode Graphite Plate

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
AGP01	1.78	7	60~72	35	0.043	/	/	/	0.5

Application:

This kind of Graphite plate can replace the traditional battery lead board , will be no pollution , small electric resistance , energy conservation, making the battery's electric capacity be improved , and can Reduce battery volume.

We can machine the graphite plate to 0.6- 1.2 mm thickness, this solved the problem of machine graphite material.

23. Cathode Graphite Plate

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
CGP01	1.78	7	60~72	35	0.043	/	/	/	0.5

Application:

1. Can be used in the electrolysis of magnesium, aluminum, manganese, zinc, copper, lead, alloy and etched-foil.
2. Can be used in the chemical industry, electronics, textile industry for the wastewater treatment.
3. Can be used in the electrolytic solution for making chlorine, and in the electrolytic salt solution for making caustic soda.
4. Used for the carrier of electroplating of various kinds of metal and non-metallic . It can make the plating products with smooth, delicate, wear-resisting, corrosion resistance, high brightness, and difficult to change color, etc.

Features:

1. High temperature resistant
2. Low electrical resistivity
3. Good electric and heat conduction performance
4. Easy machining
5. Good chemical stability
6. Acid alkali corrosion resistance
7. Low ash

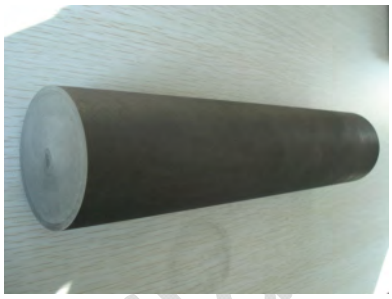
24. Graphite Electrode Paste

Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
GEP01	1.62~1.65	65~90	15~25	/	/	/	/	80~99	4.5~7.8

Application :

Graphite Electrode Paste is a self-baking electrode used in submerged arc furnaces for delivering power to the charge mix. Electrode Paste is added to the top of the electrode column in either cylindrical or briquette form. As the paste moves down the electrode column the temperature increase causes the paste to melt and subsequently bake forming a block of electrically conductive carbon.

25. Graphite Rod



Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
G-M-01	1.45	15	30	15	/	/	/	/	0.1
G-M-02	1.7	12	40	18	/	/	/	/	0.1
G-M-03	1.75	10	50	22	/	/	/	/	0.1
G-M-04	1.8	9	65	28	/	/	/	/	0.08
G-M-05	1.73	11	50	30	/	/	/	/	0.1
G-W-01	1.75	11~15	55	30	/	/	/	/	0.08
G-W-02	1.78	11~15	65	35	/	/	/	/	0.08

Applications:

Molds, chutes, sleeves, sheathes, linings, etc. in continuous casting systems for making shaped steel, cast iron, copper, aluminum;

Sintering molds for cemented carbides and diamond tools;

Sintering molds for electronic components;

Electrodes for EDM;

Heaters, heat shields, crucibles, boats in some industrial furnaces (e.g., furnaces for pulling monocrystalline silicon or optical fibers);

bearings and seals in pumps, turbines and motors; and so on.

Features:

Fine grain.

Homogeneous structure.

High density.

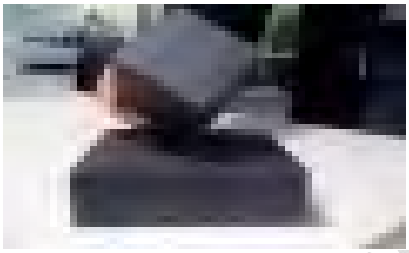
Excellent thermal conductivity.

High mechanical strength.

Proper electrical conductivity.

Minimum wet ability to molten metals.

26. Graphite Block



Technical Data									
Part number	Bulk Density	Electric Resistivity	Compressive Strength	Flexural Strength	Grain Size	Tensile Strength	Thermal Conductivity	Fixed Carbon	Ash Content
	≧g/cm³	μΩ•m	Mpa	Mpa	mm	Mpa	W/m.k	%	ppm
G-M-01	1.45	15	30	15	/	/	/	/	0.1
G-M-02	1.7	12	40	18	/	/	/	/	0.1
G-M-03	1.75	10	50	22	/	/	/	/	0.1
G-M-04	1.8	9	65	28	/	/	/	/	0.08
G-M-05	1.73	11	50	30	/	/	/	/	0.1
G-W-01	1.75	11~15	55	30	/	/	/	/	0.08
G-W-02	1.78	11~15	65	35	/	/	/	/	0.08

Applications:

Molds, chutes, sleeves, sheathes, linings, etc. in continuous casting systems for making shaped steel, cast iron, copper, aluminum;
Sintering molds for cemented carbides and diamond tools;
Sintering molds for electronic components;
Electrodes for EDM;
Heaters, heat shields, crucibles, boats in some industrial furnaces (e.g., furnaces for pulling monocrystalline silicon or optical fibers);
bearings and seals in pumps, turbines and motors; and so on.

Features:
Fine grain.
Homogeneous structure.
High density.
Excellent thermal conductivity.
High mechanical strength.
Proper electrical conductivity.
Minimum wettability to molten metals.

Graphite Oxide

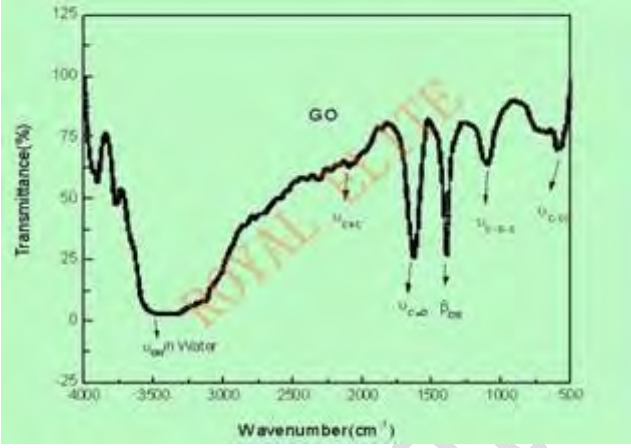
1. Graphite Oxide

Graphite Oxide, which is produced by Royal Elite in a Lab scale via a modified Hummers, has good solubility in water, ethanol, DMF etc. It is a new carbon material with good properties. Graphite Oxide can be easily dispersed in polar solvents with the help of ultrasound and it can be applied in many fields, such as preparation of graphene; conductive graphene film; biochemical materials; transparent conductive coatings; nano electro devices; sensor and optics; catalyst and energy storage.

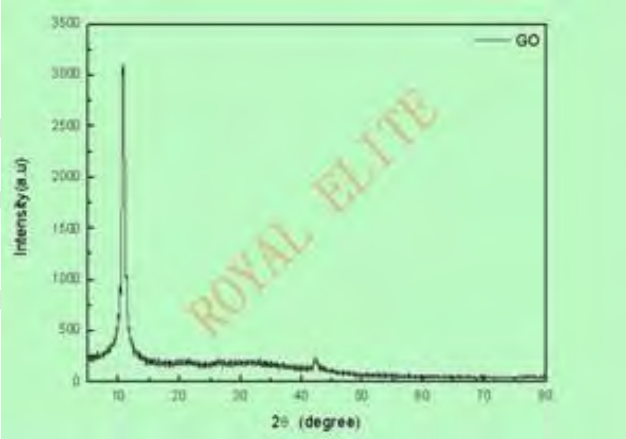
PROPERTIES:

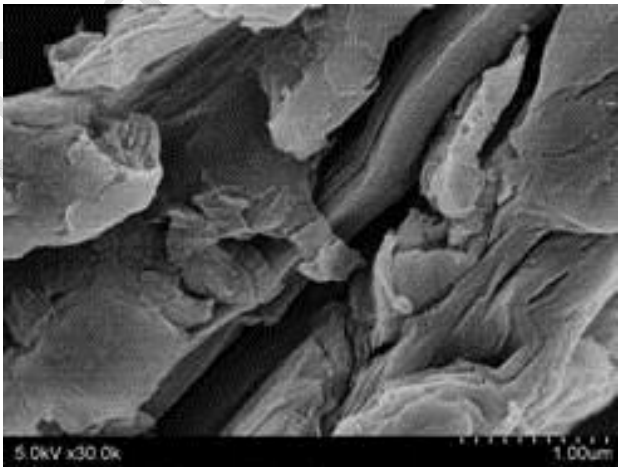
- Purity: 99%
- Stacking Density: 0.8~1g/ml
- Color: Brown solid
- C/O Ratio: 1.35

FTIR of graphite oxide



XRD of graphite oxide

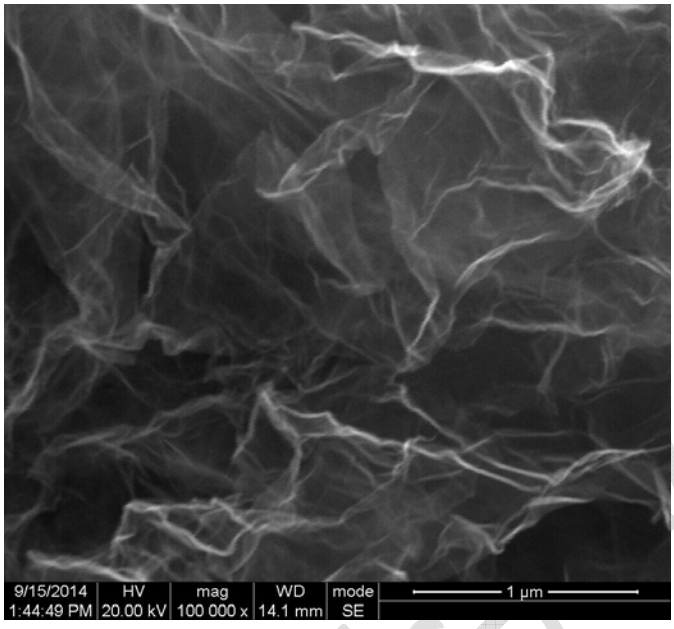




SEM

Graphene

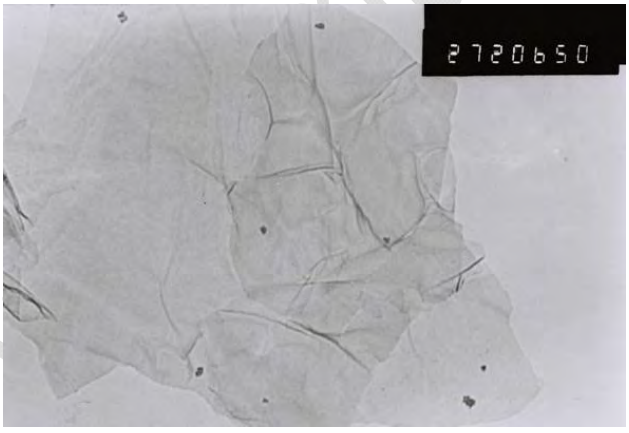
1. High Purity Graphene (TNPRGO)

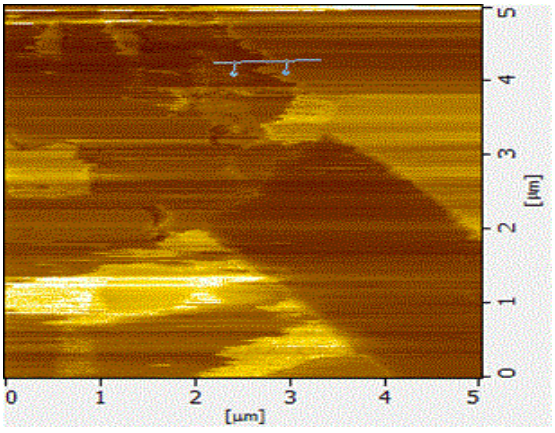


Product Description:

Purity：>98wt%
Thickness：1-3nm
Scale：2-10 µ m
Layers: <3
Specific Surface Area：300-700m2/g

2. Reduced Graphene Oxide (TN-COC-(NSR)TNRGO)

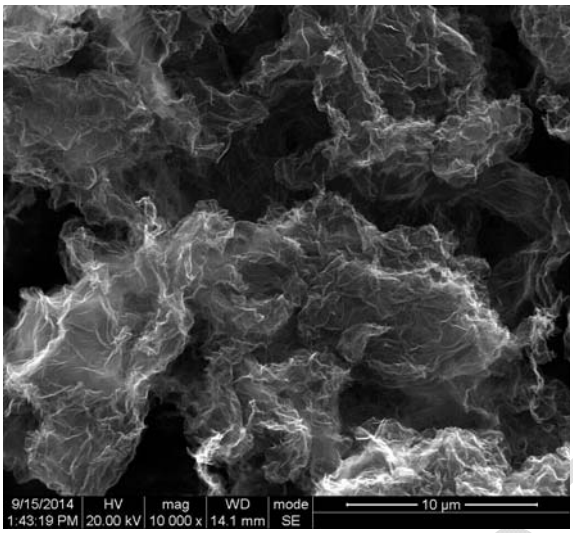


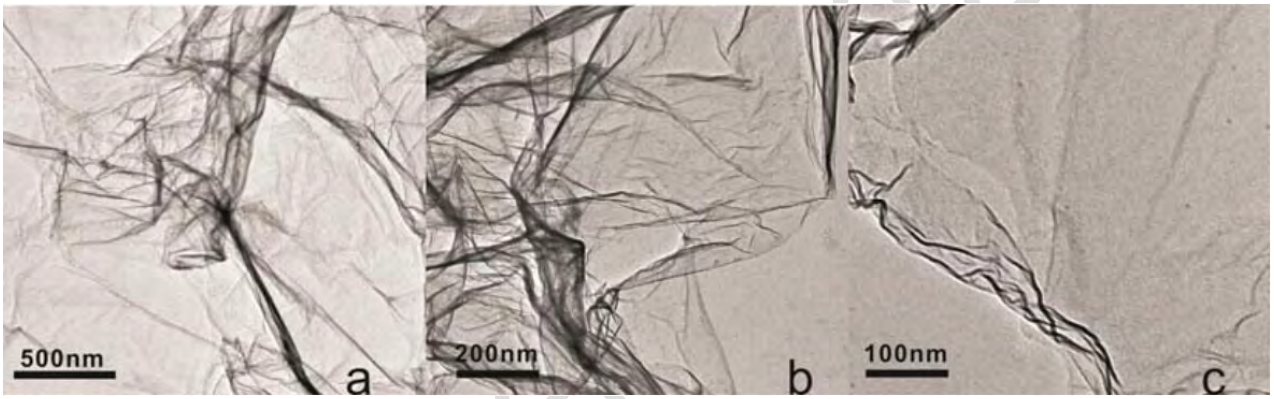


Product Description:

TimesGraphTM ----Reduced Graphene Oxide
Purity：>95wt%
Thickness：0.55~3.74nm
Diameter：0.5-3 µ m
Layers: 1-10
Specific Surface Area：500-1000m2/g

3. Nitrogen Doped Graphene (TN-COC-(NSR)TNNRGO)





Product Description:

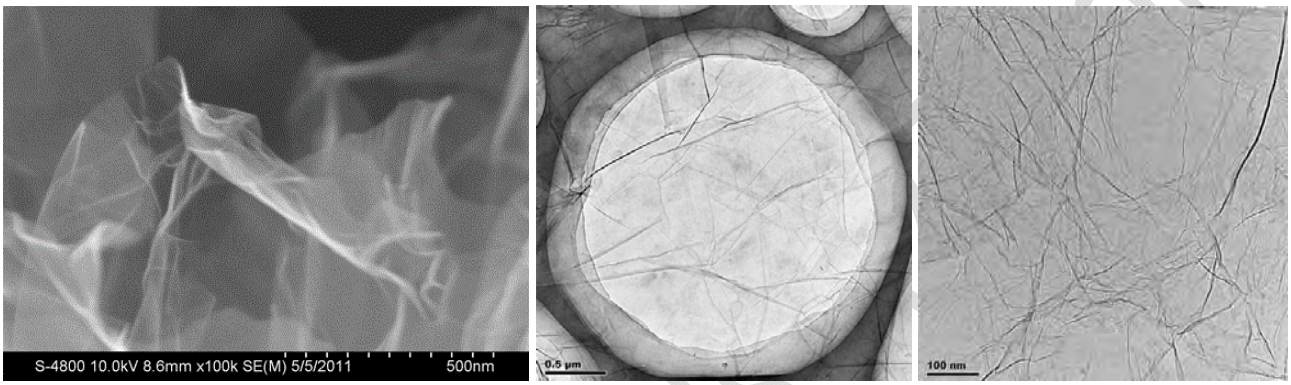
- Purity：>98wt%
- Thickness：1-3nm
- Scale：2-10μm
- Layers: <3
- Specific Surface Area：100-300m2/g

4. Single Layer Graphene

Graphene with high surface area

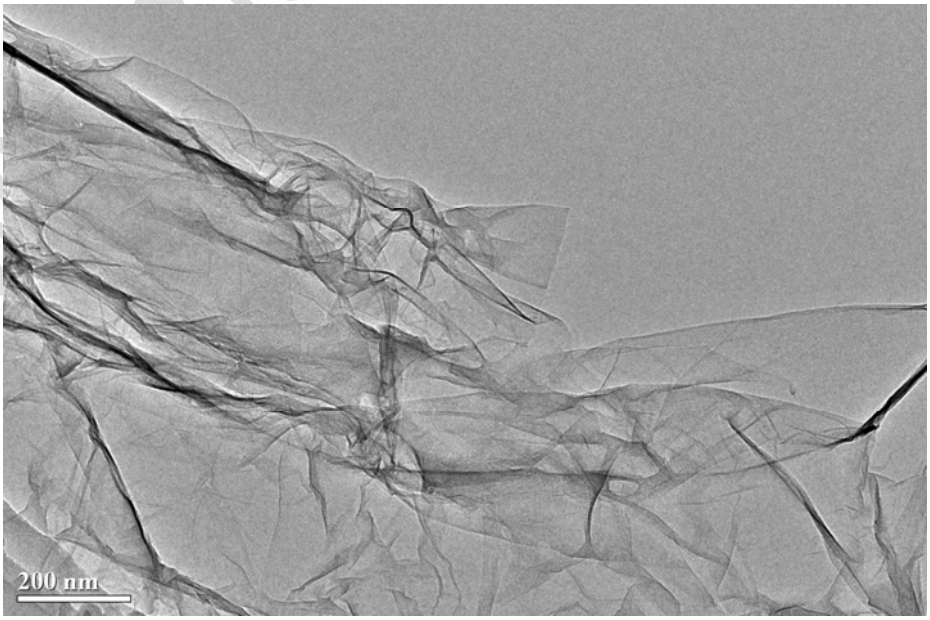
Preparation Method:	Thermal exfoliation reduction + Hydrogen reduction
BET surface area (m2/g):	400~1000
Electrical resistivity (Ω·cm):	≤0.30
Dispersible property:	Can be redispersed in most solvents with the help of sonication

Dispersible Graphene is prepared by completely reducing graphene oxide, which is prepared by the modified Hummer's method. The more common method of production creates a denser graphene that is subject to aggregations. The resulting graphene agglomerate is not soluble or redispersable in water or other polar solvents, making further processing difficult. Our Dispersible Graphene avoids this problem and can be redispersed in many solvents.

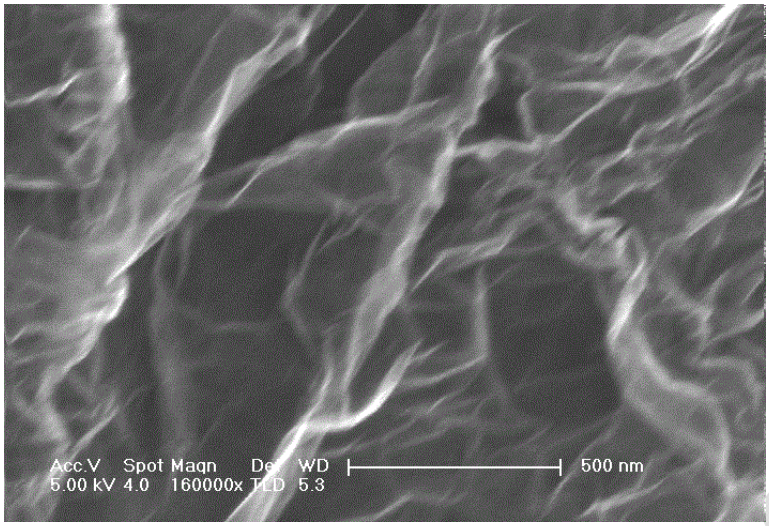


5. Single Layer Graphene

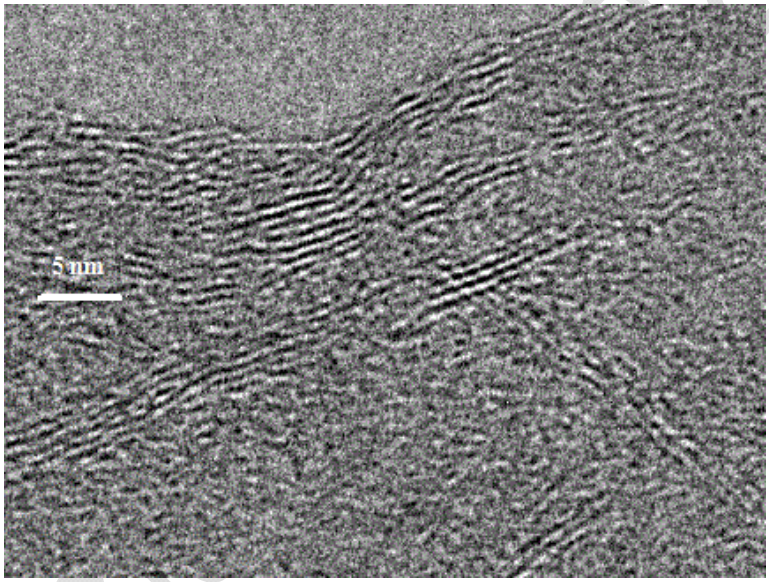
BET surface area (m^2/g)	650~750
Conductivity (S/m)	500~700
Layers	1-5 atomic layer graphene nanosheets
Lateral size (μm)	0.5-5
Oxygen (at%)	7-7.5



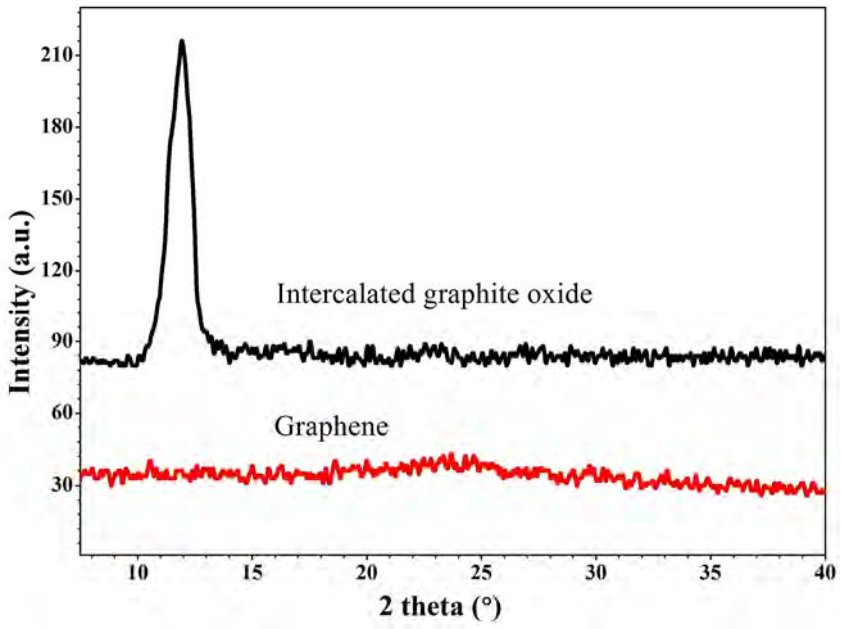
TEM Image of Single Layer Graphene



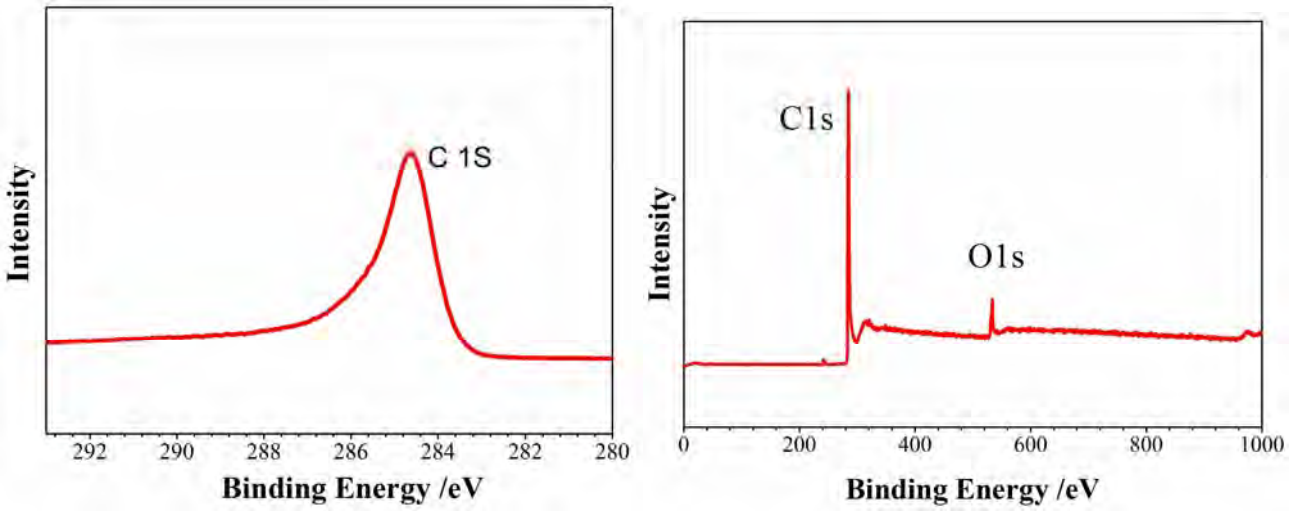
SEM Image of Single Layer Graphene



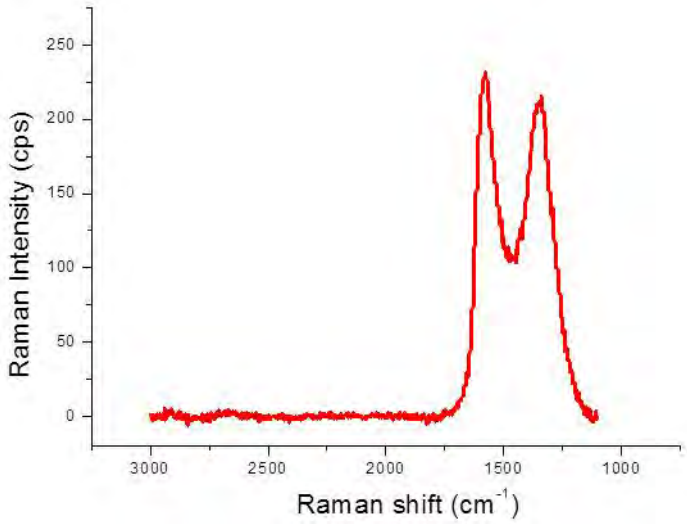
HRTEM Image of Single Layer Graphene



XRD Patterns of Single Layer Graphene



XPS Patterns of Single Layer Graphene



Raman Spectrum of Single Layer Graphene

6. Nitrogen-doped Graphene Powder

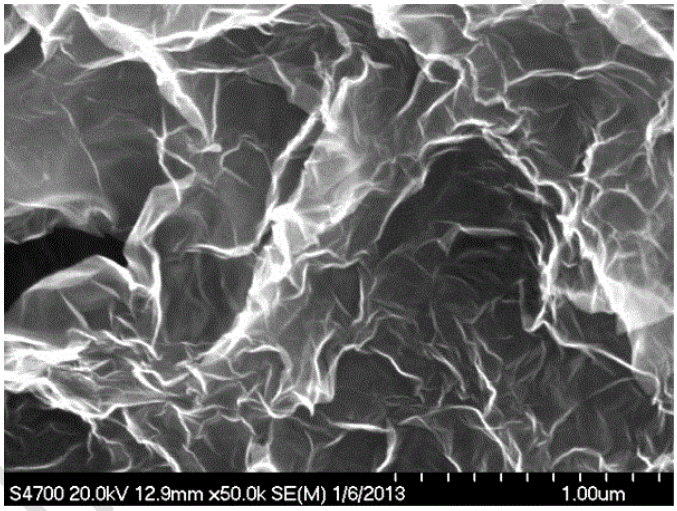
Nitrogen-doped Graphene (N-doped Graphene)

BET surface area (m^2/g)	500~700
Conductivity (S/m)	>1000 (characterized at the density of 0.3g/cm^3)
Layers	1-5 atomic layer graphene nanosheets
Lateral size (μm)	0.5-5
Nitrogen (at%)	3.0-5.0
Oxygen (at%)	7.0-7.5

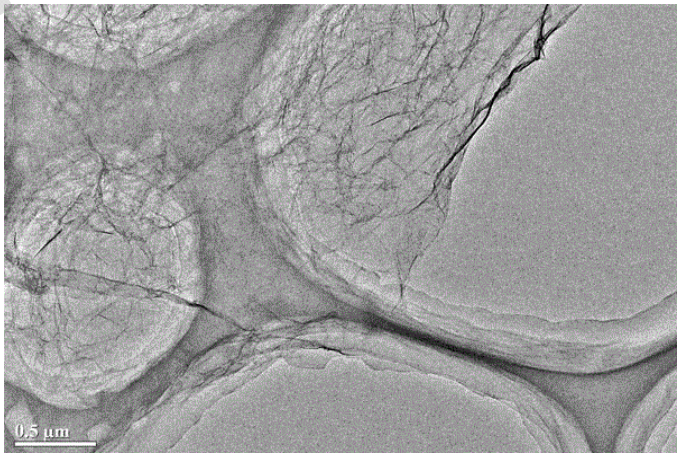
The standard N content is 3.0-5.0 at%.
The N content is controllable (ACS can customize the product): 0.5-3 at%, 5-8 at%. The minimum order quantity for the customized product is 10g.

The fluffy graphene powder has a very large volume. 10g of the powder can fill a 15L container. For shipping, we compress the product to a density of about 3×10-2g/cm3.

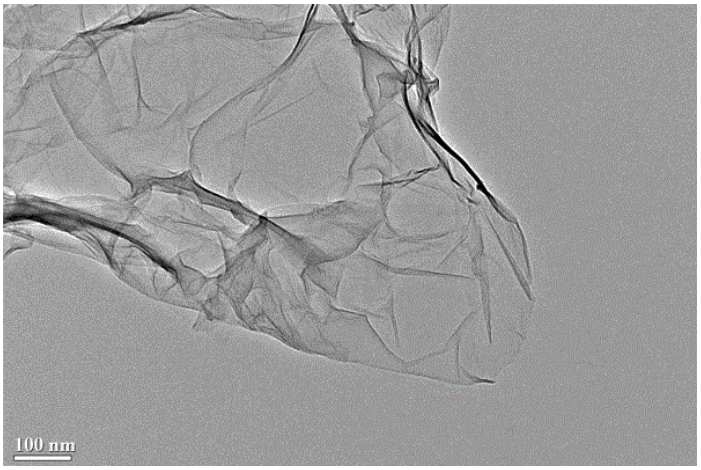
The thickness is confirmed by HRTEM. The lateral size is measured by SEM and TEM. The average surface area, oxygen content and conductivity specifications are characterized by BET method, XPS and Hall measurement, respectively.



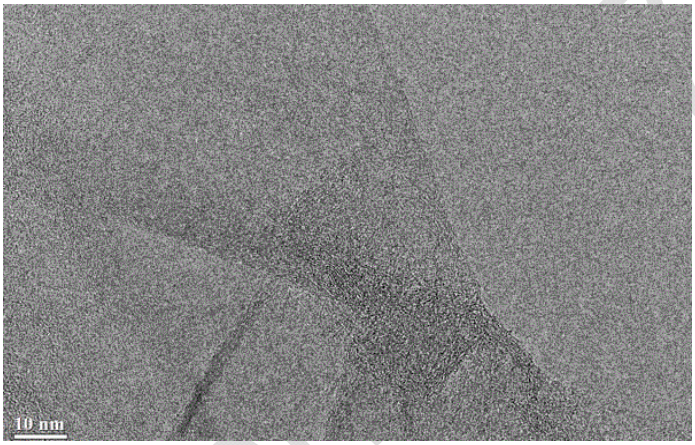
SEM Image of N-doped Graphene



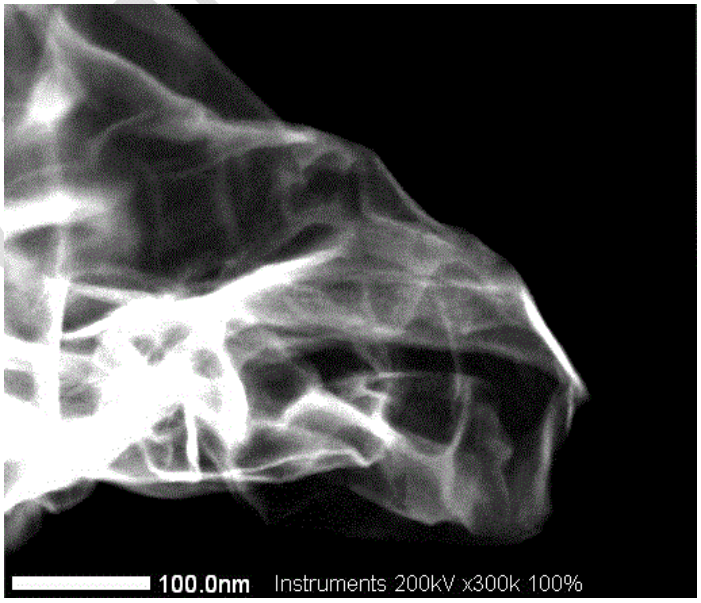
TEM Image (1) of N-doped Graphene



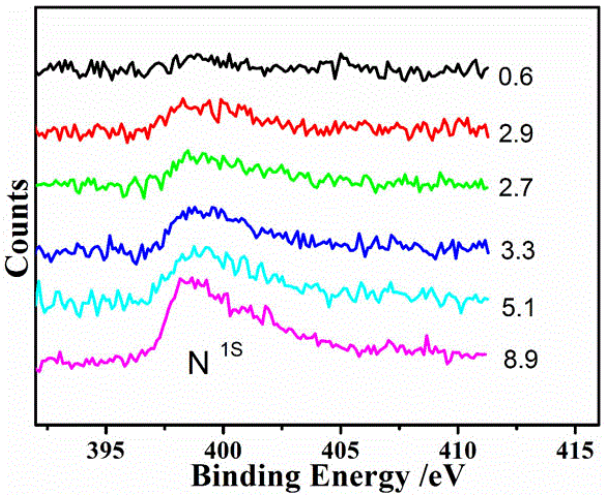
TEM Image (2) of N-doped Graphene



HRTEM Image of N-doped Graphene



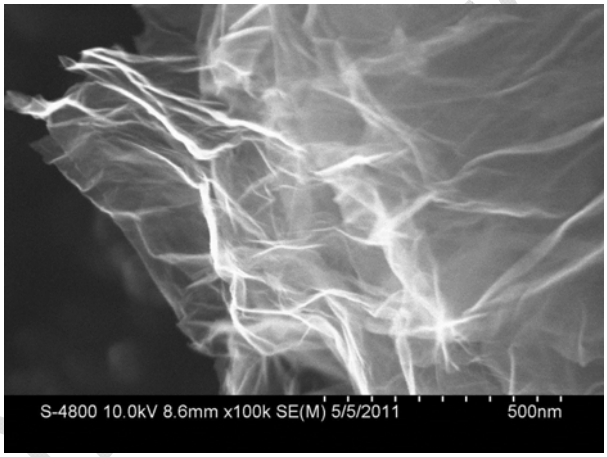
STEM Image of N-doped Graphene



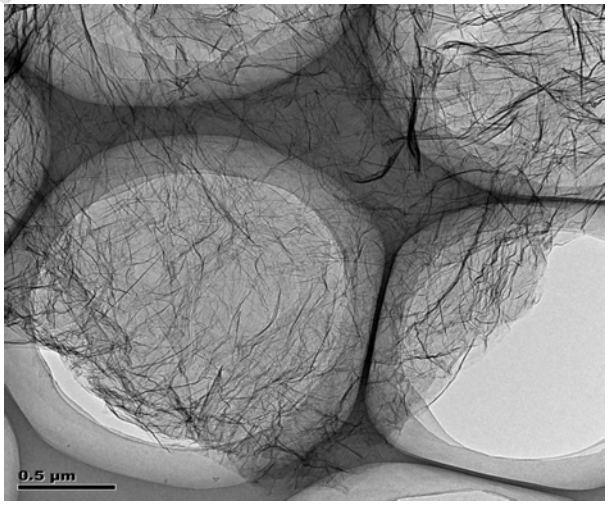
XPS Image of N-doped Graphene

7. Industrial-Quality Graphene

Preparation Method: Thermal exfoliation reduction
Thickness (nm): ≤3.0
BET surface area (m^2/g): ~600
Electrical resistivity (Ω.cm): ≤0.30



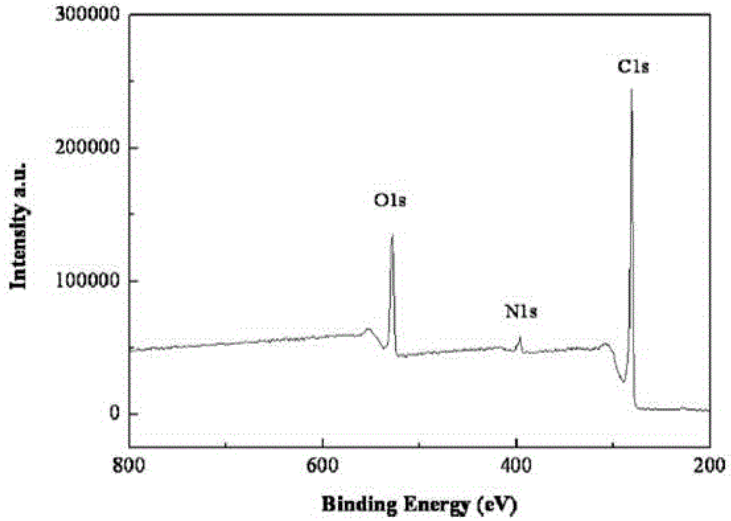
SEM image of Industrial-Quality Graphene

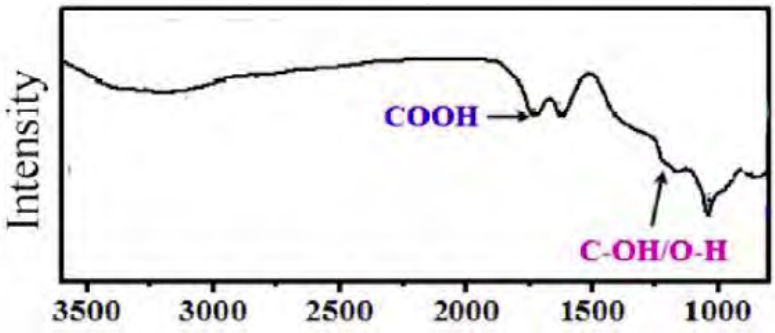


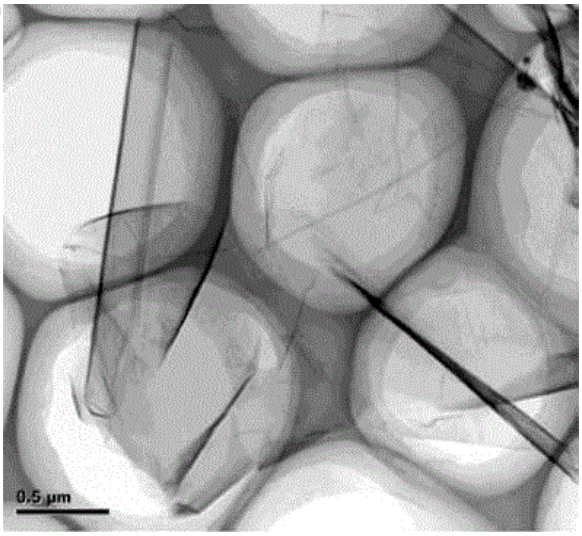
TEM image of Industrial-Quality Graphene

8. Carboxyl Graphene

Carboxyl Graphene	
Diameter	1~5 μm
Thickness	0.8~1.2 nm
Carboxyl Ratio	~5.0%
Purity	~99%



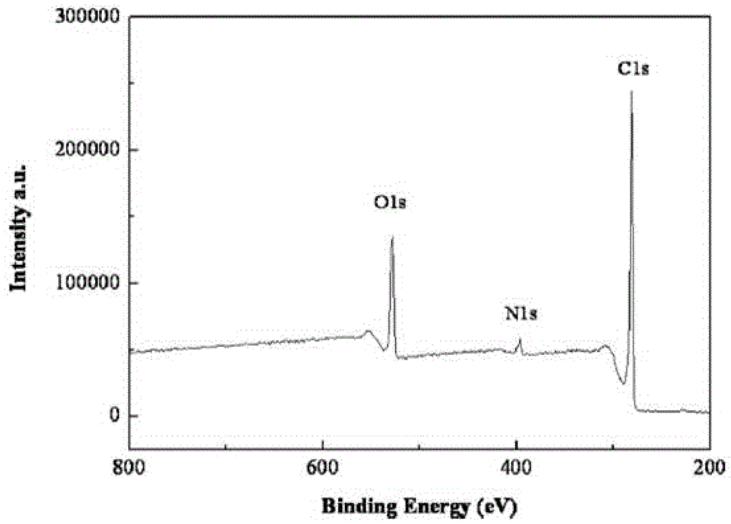


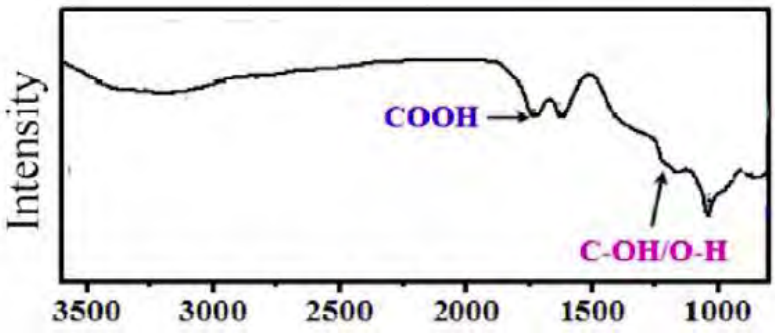


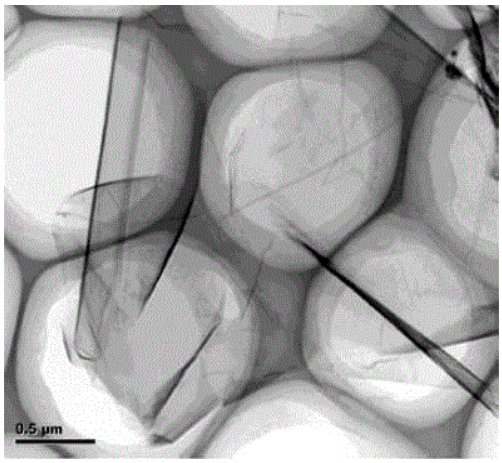
9. Carboxyl Graphene Water Dispersion

Concentration: 5mg/ml. 100ml per bottle (500mg)

Carboxyl Graphene	
Diameter	1~5 μm
Thickness	0.8~1.2 nm
Carboxyl Ratio	~5.0%
Purity	~99%



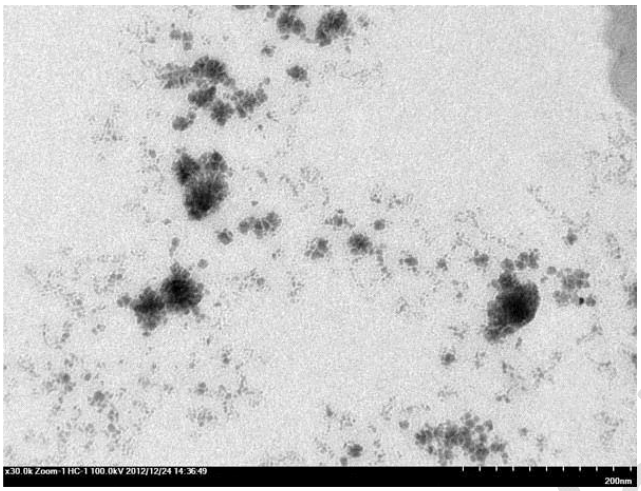




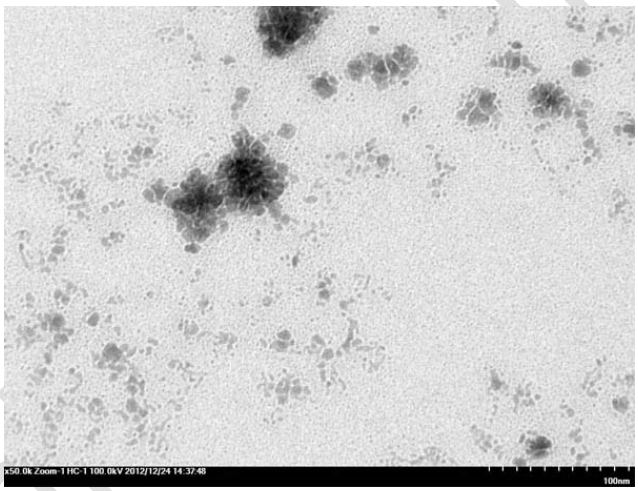
10. Graphene Quantum Dots

The solutions of GQDs emits blue light (460 nm) when excited with 365 nm UV beam.
We can provide this product with a concentration up to 20 mg/ml.
Conditions for safe storage:
Please store the products in a refrigerator at 1-10 °C.

Preparation Method Bottom-up method
Quantum Dots Size~15 nm
Thickness0.5-2 nm
Purity~80%
Standard Concentration1 mg/ml



TEM image (1) of Graphene Quantum Dots



TEM image (2) of Graphene Quantum Dots

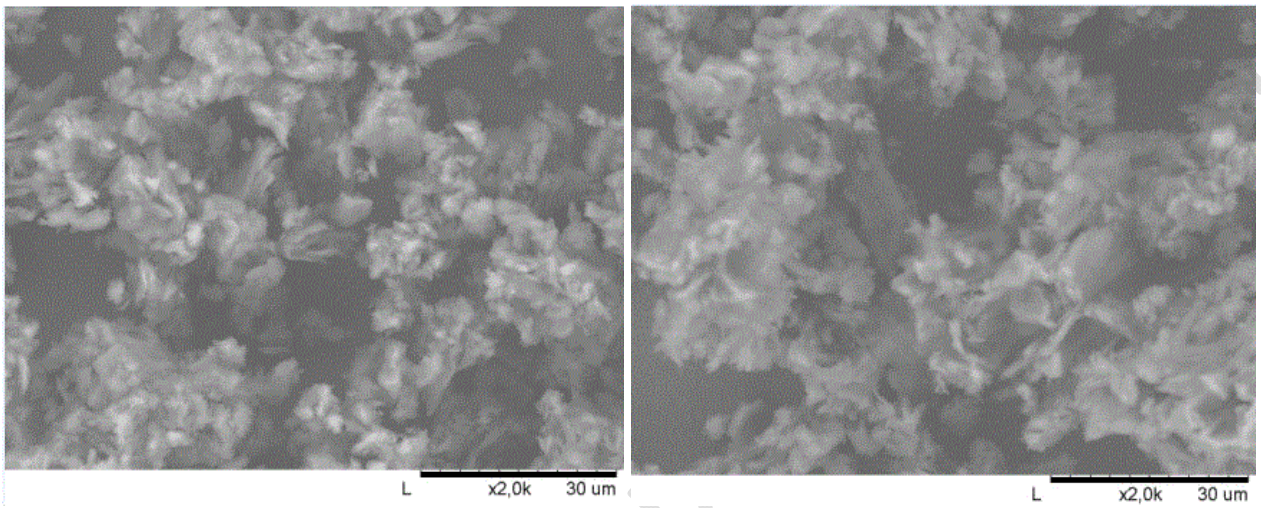
The solutions of GQDs emits blue light (460 nm) when excited with 365 nm UV beam.

11. Aminated Graphene Amino-PEG covalently linked

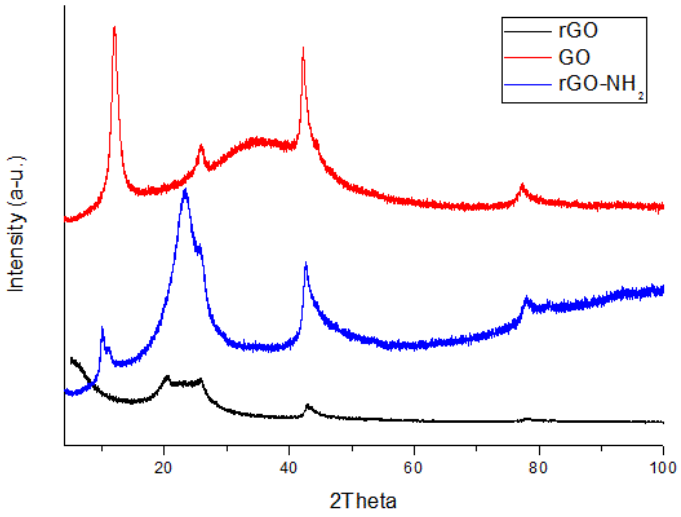
Reduced Graphene Oxide-NH2

1. Preparation Method
1) Modified Hummer's Method to make graphene oxide.
2) Convert –OH and C-O-C into –NH2.

2. Physical and Chemical Properties

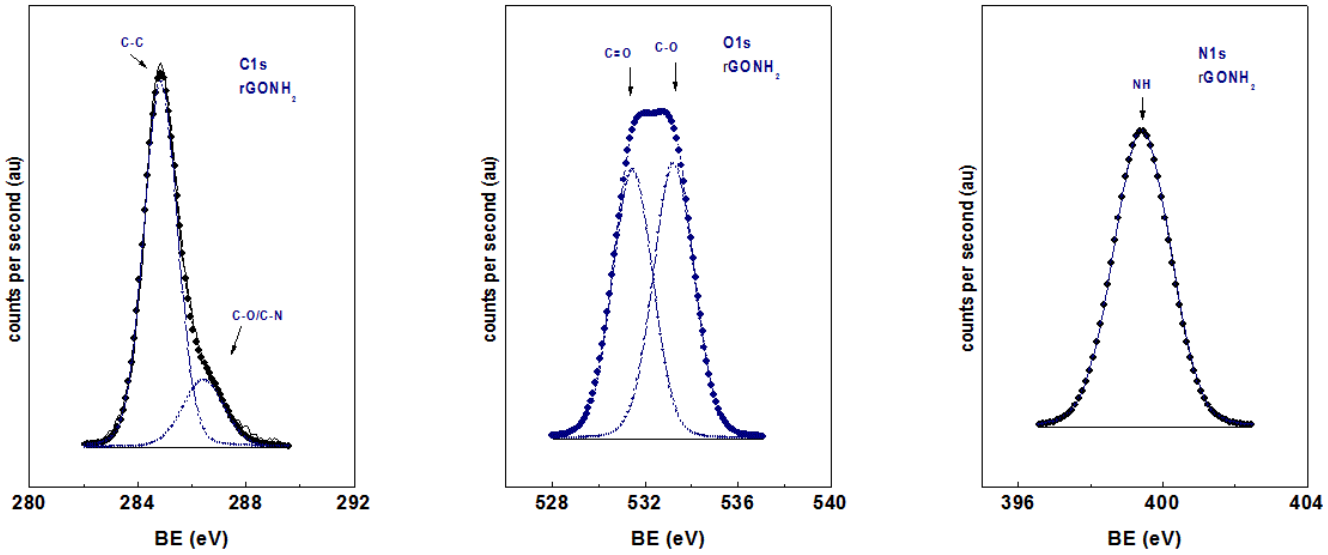


SEM image for reduced Graphene oxide-NH2



XRD pattern of GO, rGO and rGO-NH2

	C1s	O1s	N1s	O/C atomic ratio	N/C atomic ratio
rGO-NH_2	284.8 (82)	531.5 (49)	399.4	0.006	0.162
	286.4 (18)	533.2 (51)			
GO-NH_2	284.8 (52)	531.1 (30)	399.6	0.255	0.08
	286.2 (37)	532.6 (70)			
	288.0 (11)				
GO	284.8 (38)	531.5 (21)	--	0.655	--
	286.6 (54)	532.7 (79)			
	288.4 (8)				



Binding energies (eV) and deconvoluted peaks (%) for C1s, O1s and N1s core levels

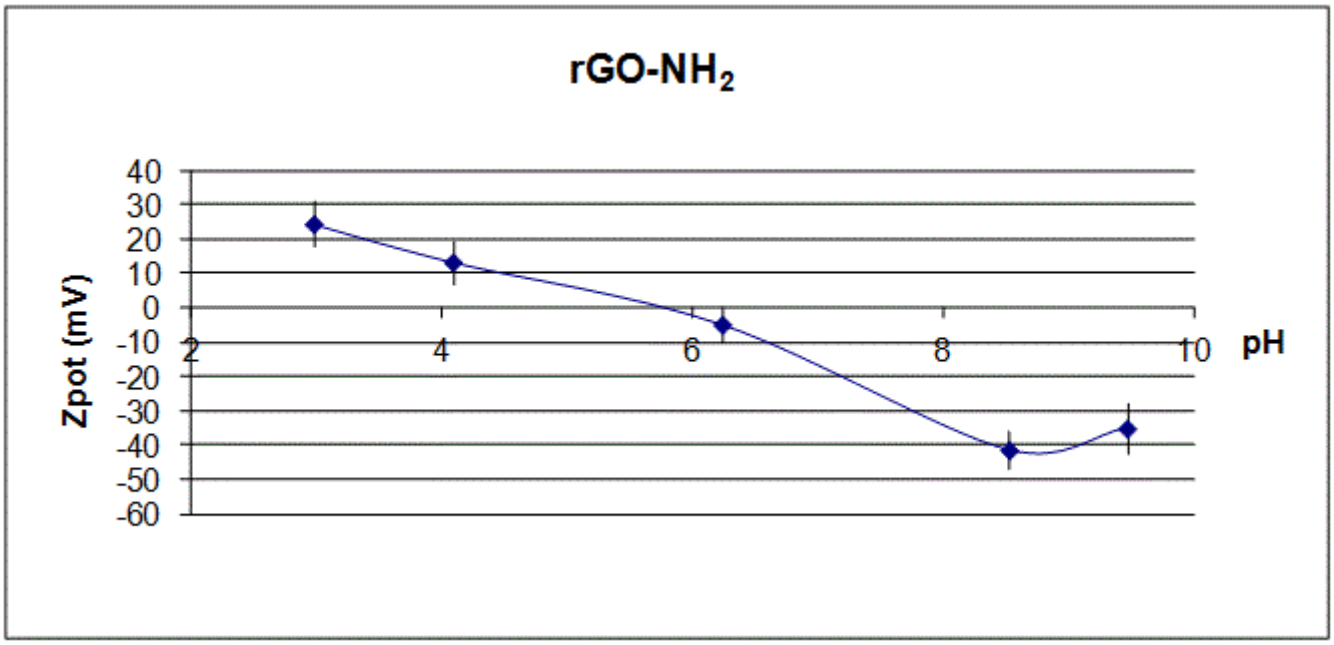
Elemental Analysis

	%C	%H	%N	%S
rGO-NH_2	69.82	3.59	6.98	0.02
GO-NH_2	67.61	3.72	6.41	0.04
GO	53.24	2.51	0.04	0.91

The number of free amino groups measured with a quantitative Kaiser test: 0.1 mmol NH2/g.

Amount of NH2 groups:
In order to estimate the amount of NH2 groups in rGO-NH2 a reaction with tetrabromophthalic anhydride performed and the Br amount was quantified by X-ray fluorescence spectroscopy and by the Schöniger flask test. The value obtained corresponds to 0.23 mmol/g and 0.21 mmol/g respectively.

Zeta-potential



Zeta-potential versus pH curve for rGO-NH_2

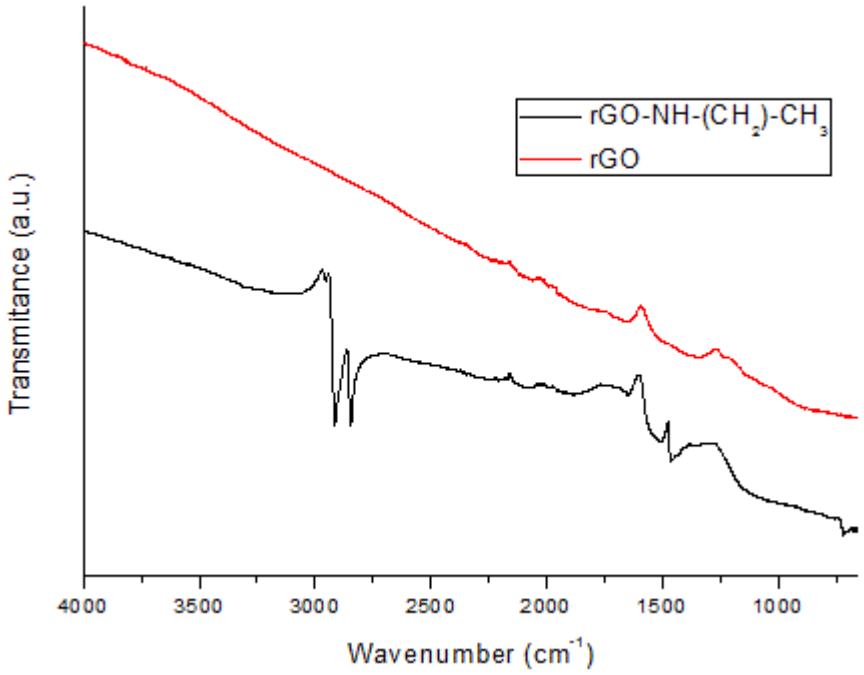
3. Application Fields

Super capacitors; Catalyst; Solar energy; Graphene semiconductor chips; Conductive graphene film; Graphene computer memory; Biomaterials; Transparent conductive coatings.

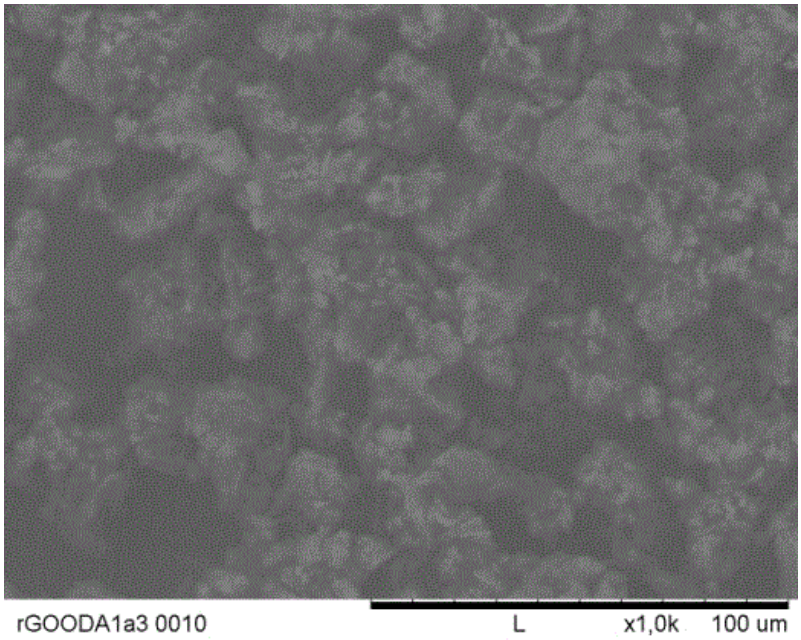
12. Aminated Graphene Octadecylamine covalently linked

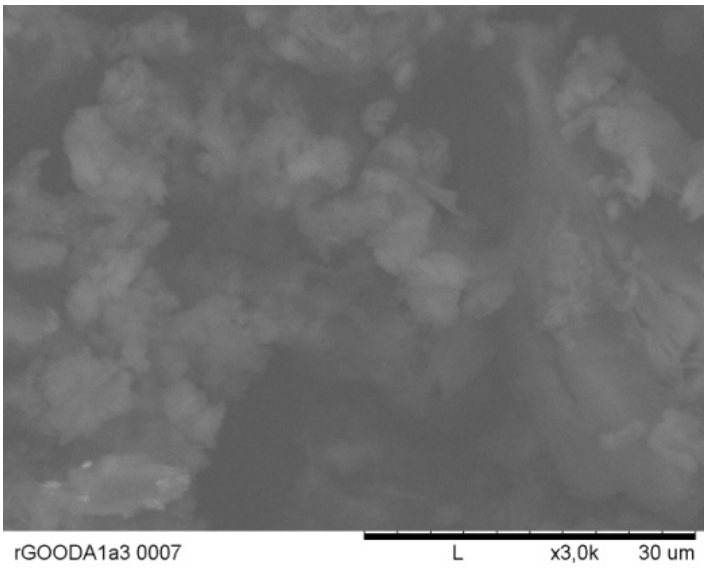
Reduced Graphene Oxide-NH-(CH2)17-CH3

FTIR Spectroscopy: Attenuated Total Reflectance (ATR)

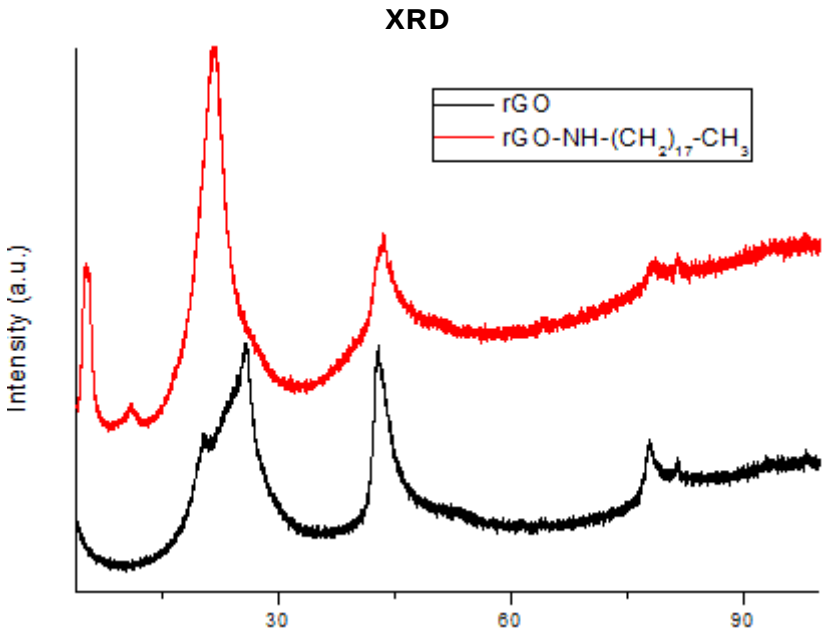


Assignment (cm-1): 2915, 2846, 1538 and 1465.





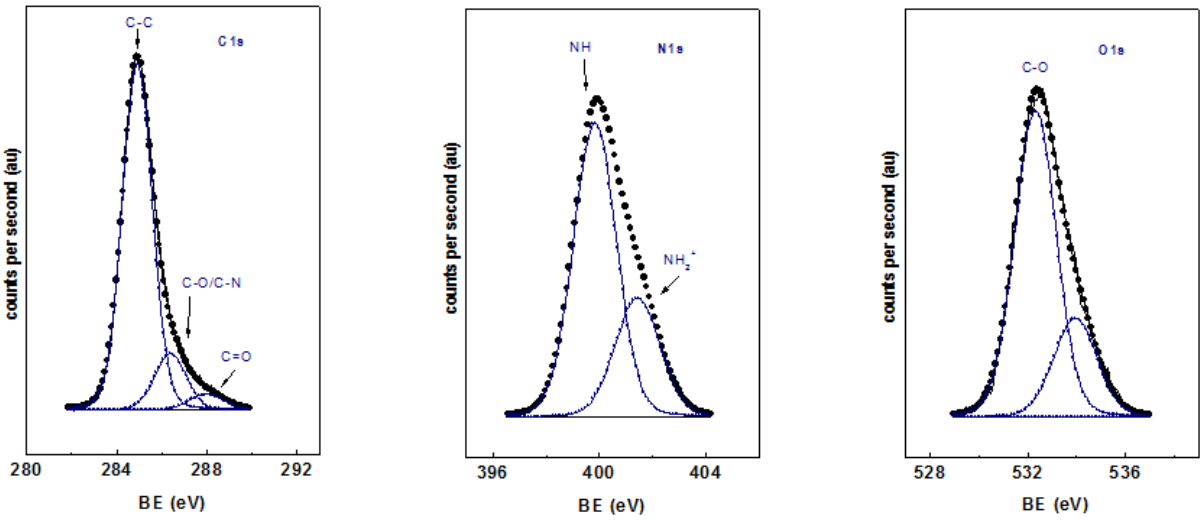
SEM images for Reduced Graphene Oxide-NH-(CH2)17-CH3



XRD pattern of rGO and rGO-NH-(CH2)17-CH3. The peak at 2θ = 5.1° is related to the longer interplanar distance of graphene due to octadecylamine chains.

XPS

	C1s	O1s	N1s	O/C at.	N/C at.
rGO-NH-$(CH_2)_{17}$-CH_3	284.8 (82)	532.3 (75)	399.8 (70)	0.067	0.031
	286.4 (14)	534.0 (25)	401.4 (30)		
	288.0 (4)				
GO	284.8 (38)	531.5 (21)	--	0.655	--
	286.6 (54)	532.7 (79)			
	288.4 (8)				

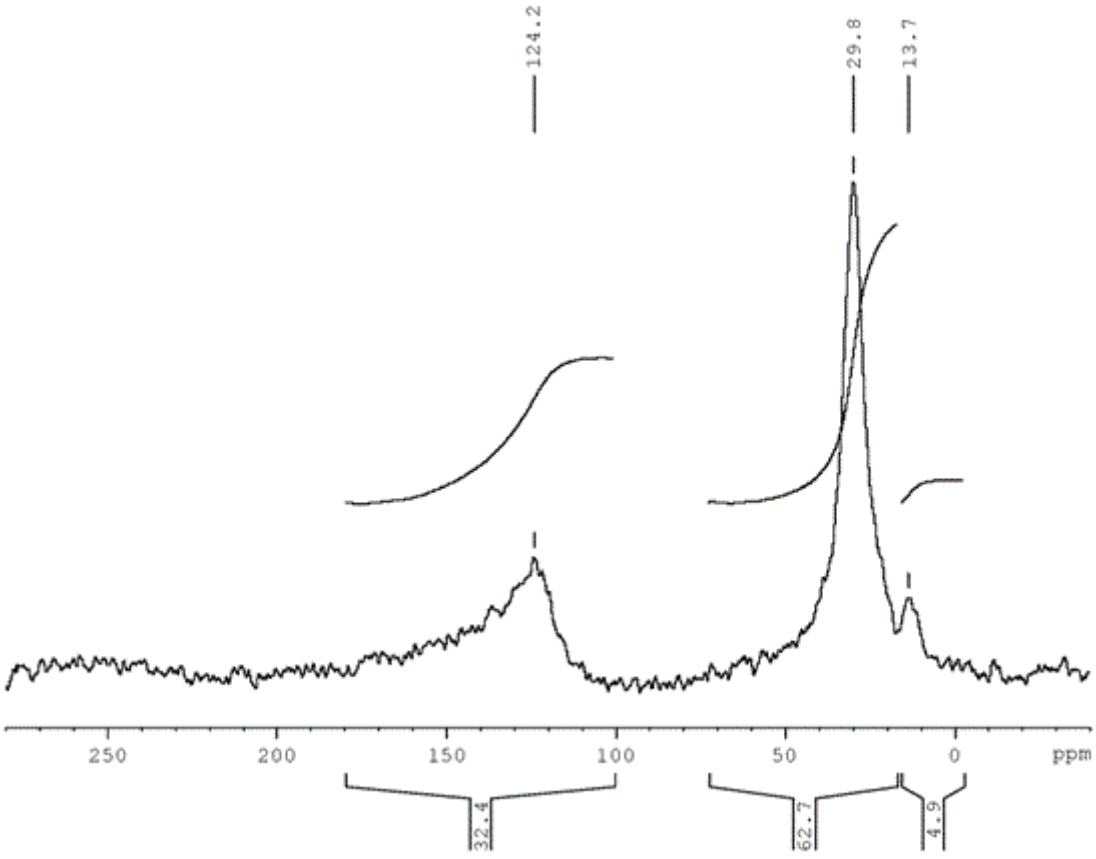


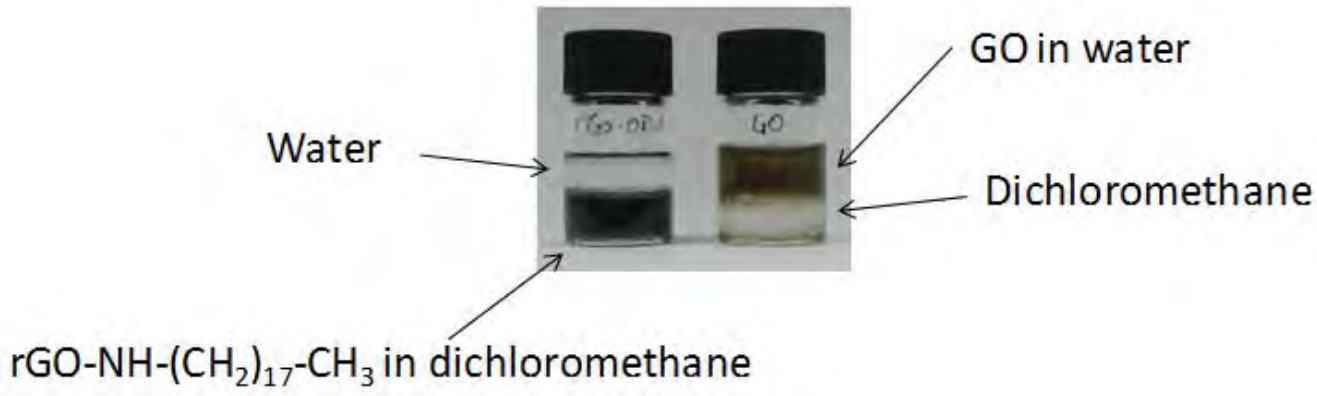
Binding energies (eV) and deconvoluted peaks (%) for C1s, O1s and N core levels.

Elemental Analysis

	%C	%H	%N	%S
rGO-NH-$(CH_2)_{17}$-CH_3	80.91	8.22	3.11	0.02
GO	53.24	2.51	0.04	0.91

Solid-state 13C NMR





Distribution of rGO-NH-(CH2)17-CH3 (left) and graphene oxide (right) in a mixture of water (up) and dichloromethane (down) showing hydrophobicity of rGO-NH-(CH2)17-CH3.

Amount of ODA

In order to estimate the amount of octadecylamine chains in rGO-NH-(CH2)17-CH3 a reaction with 4-bromobenzyl chloride was performed and the Br amount was quantified by the Schöniger flask test. The value obtained corresponds to 0.1 mmol of octadecylamine/g.

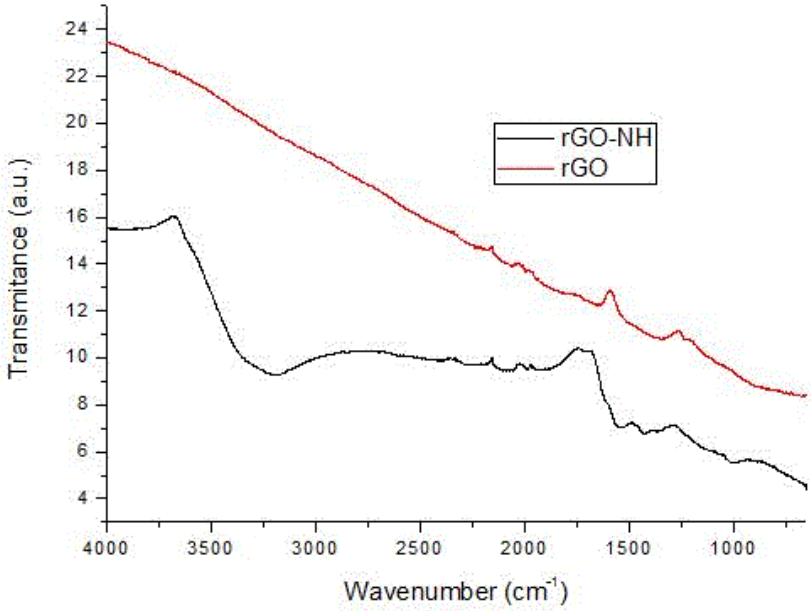
Conductivity

Conductivity of pressed pellets of rGO-NH-(CH2)17-CH3 is 6.36 S/m.

13. Aminated Graphene Piperazine covalently linked

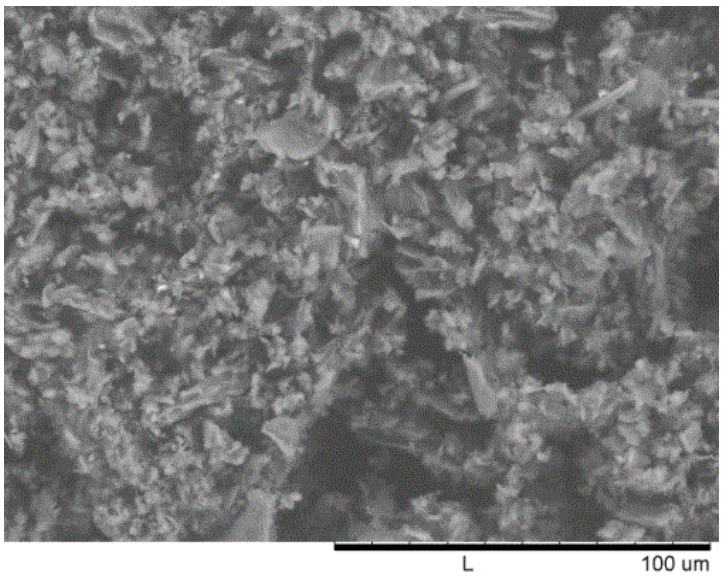
Reduced Graphene Oxide-NH

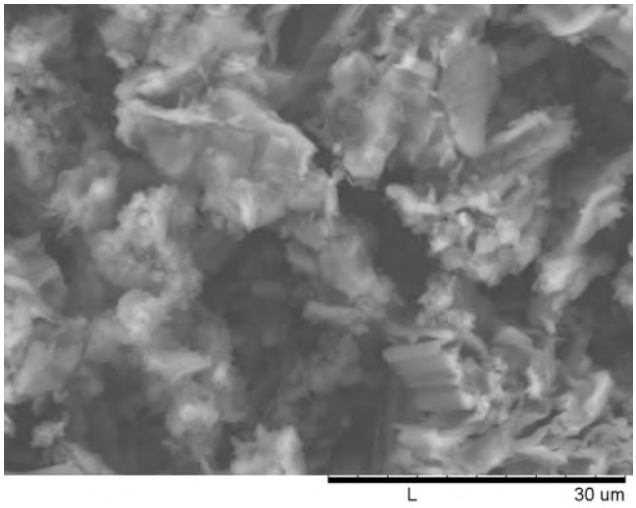
FTIR Spectroscopy: Attenuated Total Reflectance (ATR)

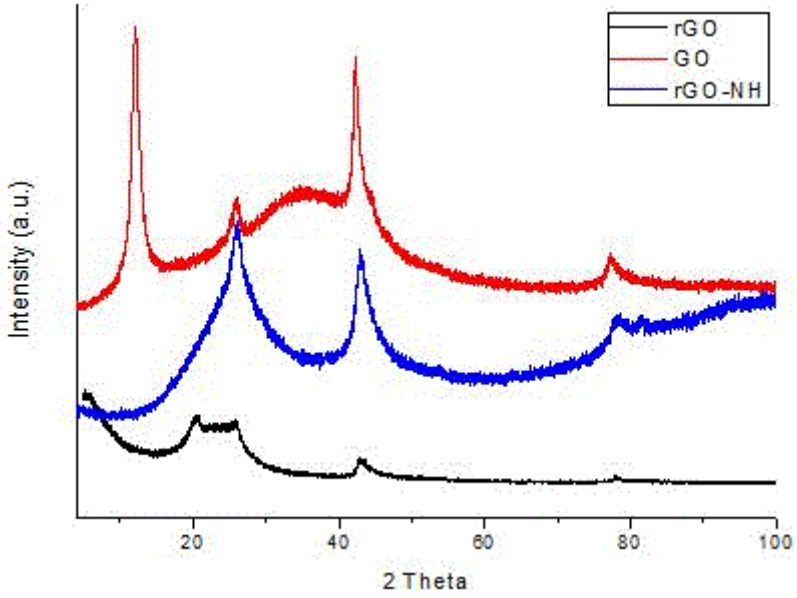


Assignment (cm-1): For rGO-NH 1550 (N–H bending), 1433 (C-N stretching).

Scanning Electron Microscopy



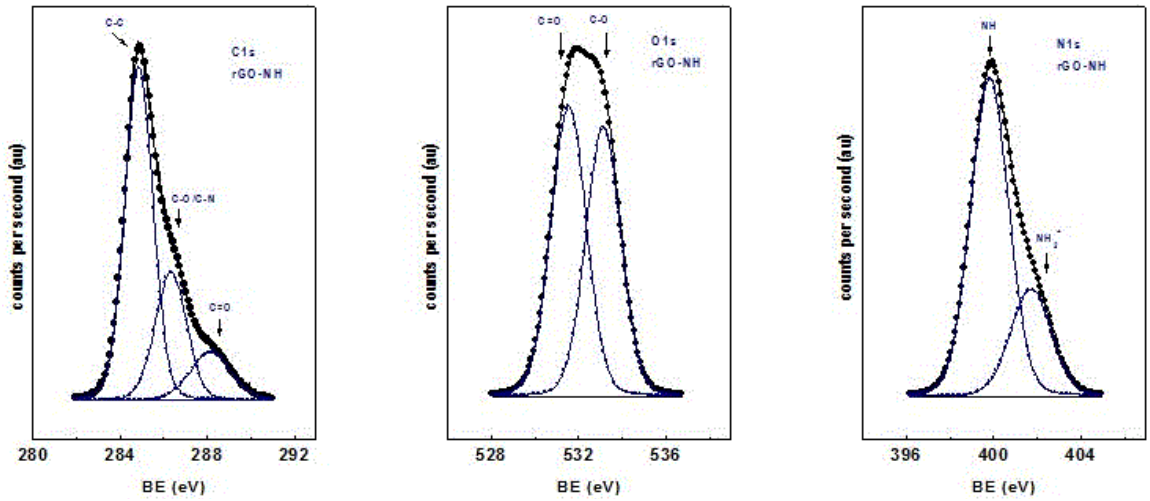




XRD pattern of GO, rGO and rGO-NH.

XPS

	C1s	O1s	N1s	O/C atomic ratio	N/C atomic ratio
GONH	284.8 (57)	531.5 (45)	399.7 (73)	0.202	0.091
	286.3 (31)	532.9 (55)	401.7 (27)		
	288.0 (12)				
rGONH	284.8 (61)	531.5 (52)	399.8 (73)	0.157	0.083
	286.3 (26)	532.9 (48)	401.7 (27)		
	288.1 (13)				
GO	284.8 (38)	531.5 (21)	--	0.655	--
	286.6 (54)	532.7 (79)			
	288.4 (8)				

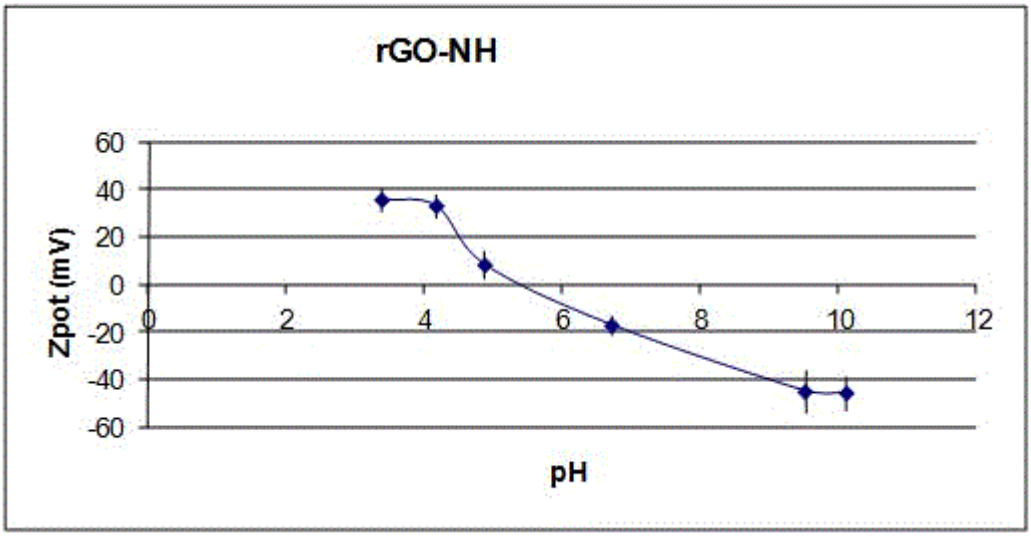


Binding energies (eV) and deconvoluted peaks (%) for C1s, O1s and N1s core levels.

Elemental analysis

	%C	%H	%N	%S
GO-NH	59.58	3.79	5.33	0.11
rGO-NH	66.58	2.83	5.27	0.05
GO	53.24	2.51	0.04	0.91

Zeta-potential



Zeta-potential versus pH curve for rGO-NH.

Amount of NH groups

In order to estimate the amount of NH groups in rGO-NH a reaction with 4-bromobenzyl chloride was performed and the Br amount was quantified by X-ray fluorescence spectroscopy. The value obtained corresponds to 0.13 mmol/g.

• Conductivity

Conductivity of pressed pellets of rGO-NH is 70.75 S/m.

14. Graphene Nanopowder

We offer a broad selection of graphene and graphite nanopowders:

Reduced Graphene Oxide

RGO has a high surface area and is more hydrophillic than graphite; it can be advantageous for mixing with polymers.

Graphene Nanoplatelets

GNP's are graphite platelets which are a few microns in lateral size. The thickness of GNP's changes with their grade from a few nanometers to tens of nanometers.

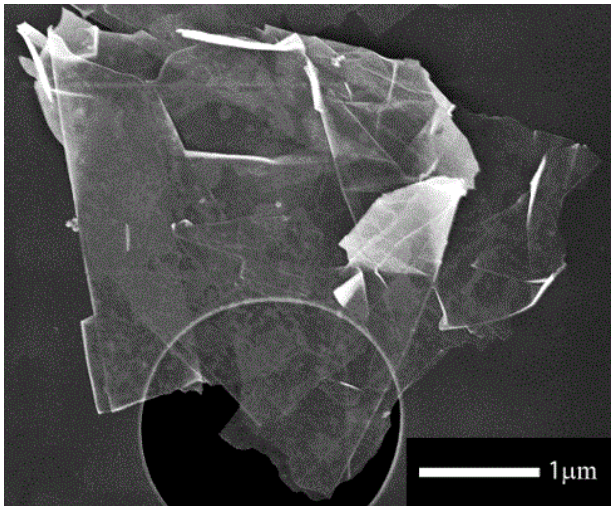
Nanostructured Graphite

Nano Graphite has smaller lateral dimensions than Graphene Nanoplatelets and is a cost-effective alternative.

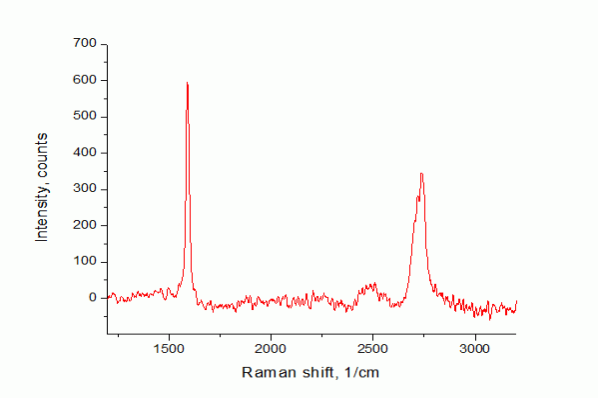
a) High Surface Area Graphene Nanopowders

i) A-12 Graphene Nanopowder: 25 grams

Properties
Color: Black
Average Thickness: < 3nm (between 3-8 graphene monolayers)
Lateral dimensions: 2-8 microns



SEM Image of A-12 GNP. Please note, the circle in the image is a result of the underlying substrate



Raman Spectrum

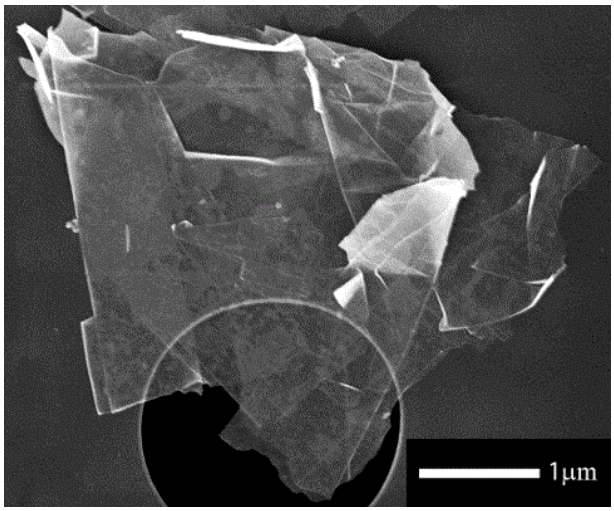
Applications

- An additive for Lithium-Ion batteries
- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

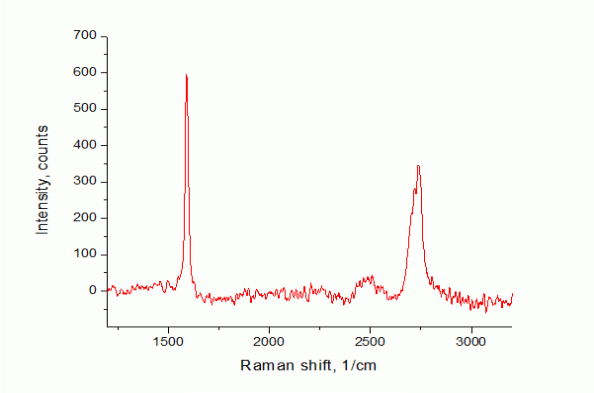
ii) A-12 Graphene Nanopowder: 5 grams

Properties

Color: Black
Average Thickness: < 3nm (between 3-8 graphene monolayers)
Lateral dimensions: 2-8 microns



SEM Image of A-12 GNP. Please note, the circle in the image is a result of the underlying substrate



Raman Spectrum

Applications

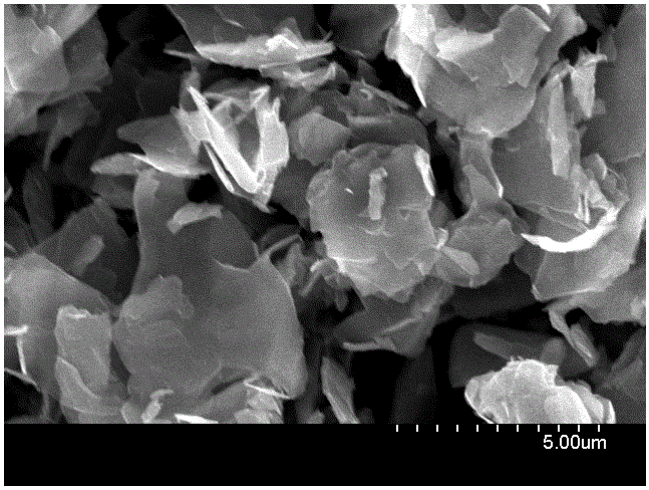
- An additive for Lithium-Ion batteries
- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

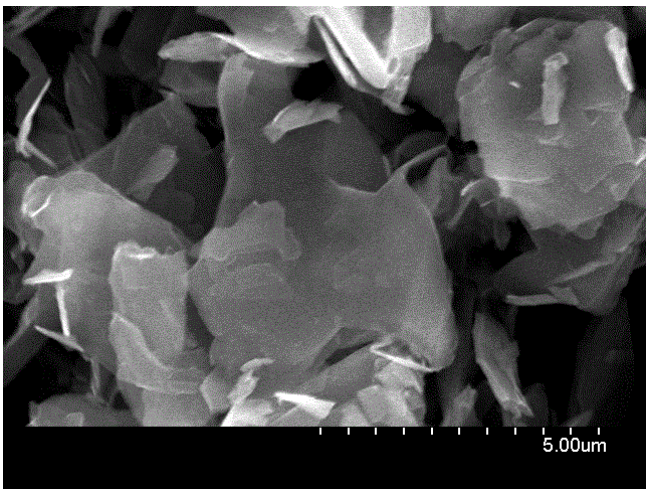
iii) Graphene Nanopowder: 1.6 nm Flakes - 1 g

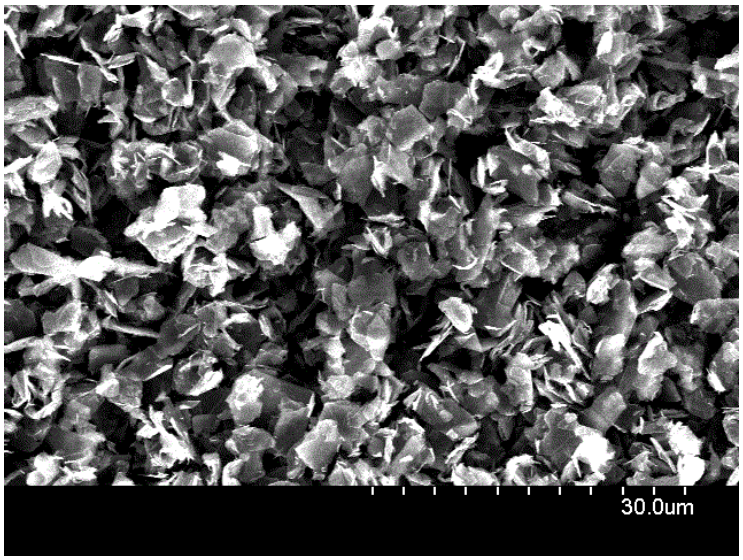
Specifications:

- Specific surface area-510 m2/g
- Color: Black
- Solid content: 98%
- Carbon: 97%, Hydrogen 1%, Oxygen 2%
- Average flake thickness: 1.6 nm (less than 3 monolayers)
- Average Particle (lateral) size: ~10 microns.

Typical SEM images of dry nanopowder:

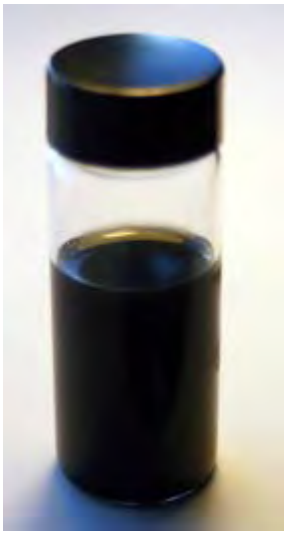






Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Dispersible in DMF and alcohols: Solution in DMF

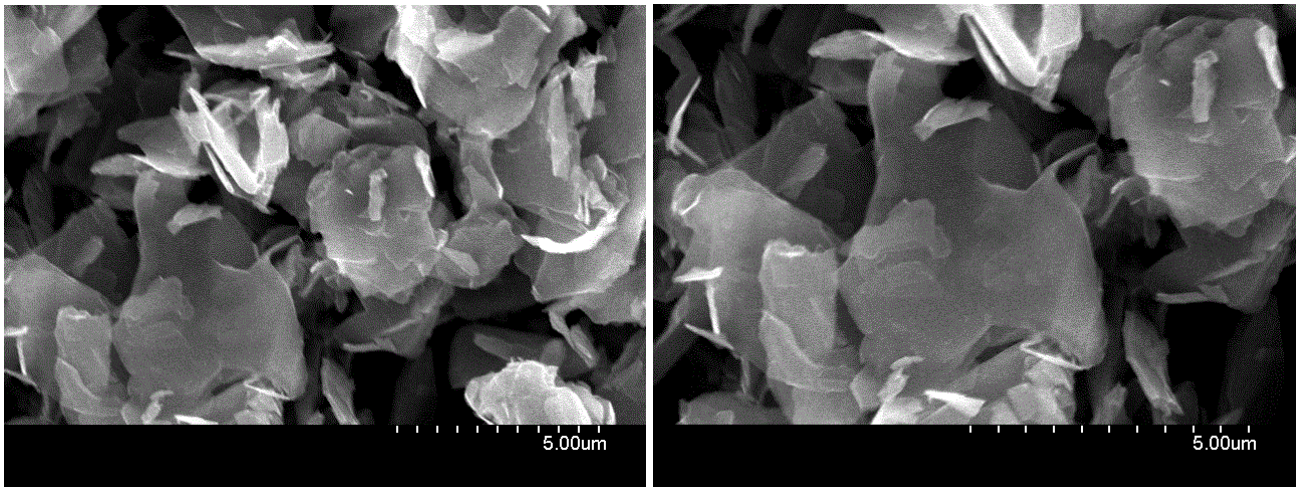


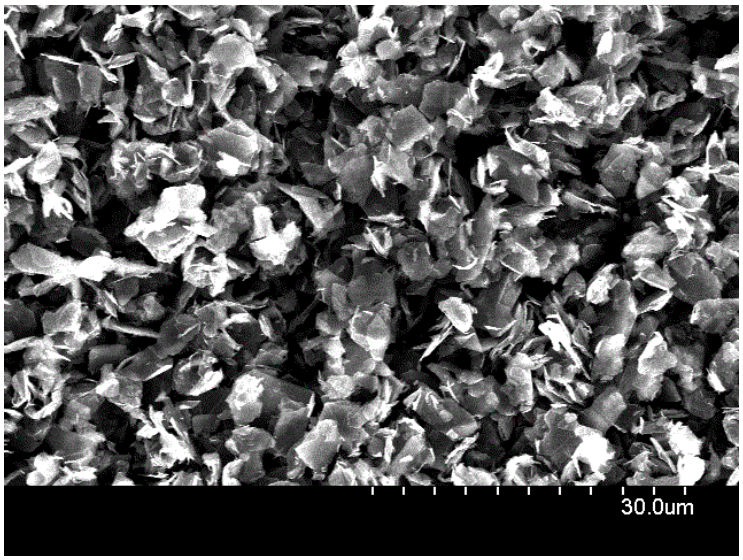
iv) Graphene Nanopowder: 1.6 nm Flakes-Trial Size 0.5 g

Specifications:

- Specific surface area-510 m2/g
- Color: Black
- Solid content: 98%
- Carbon: 97%, Hydrogen 1%, Oxygen 2%
- Average flake thickness: 1.6 nm (less than 3 monolayers)
- Average Particle (lateral) size: ~10 microns.

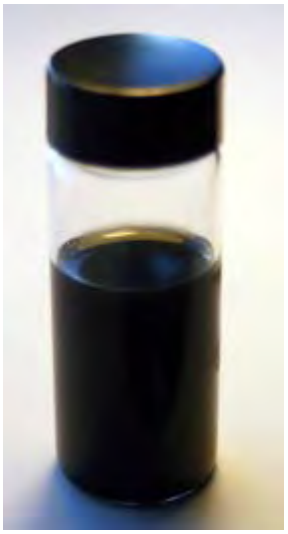
Typical SEM images of dry nanopowder:





Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Dispersible in DMF and alcohols: Solution in DMF

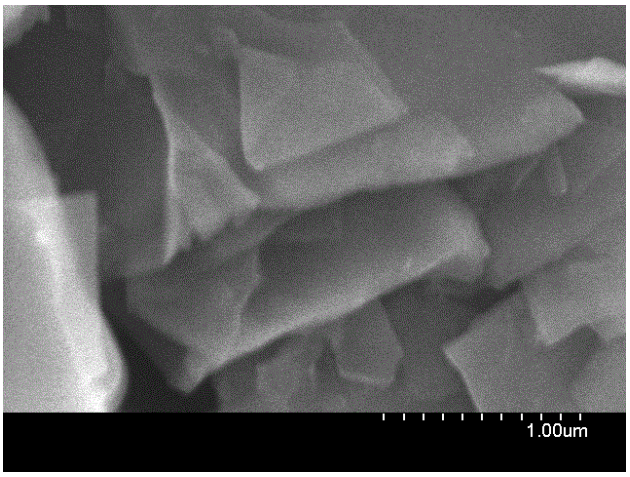


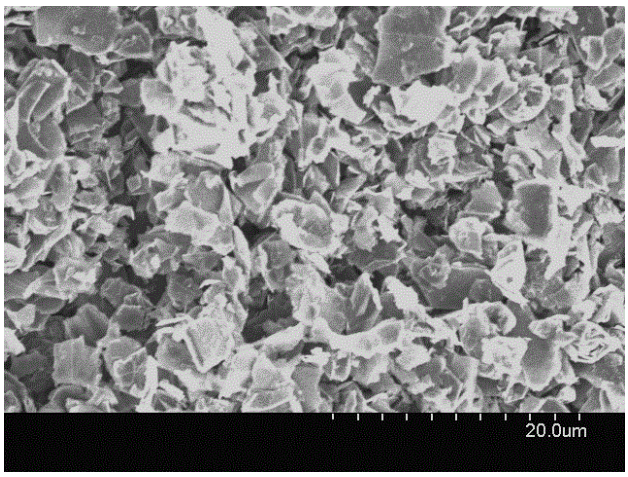
V) Graphene Nanopowder: 8 nm Flakes- 5 g

Specifications:

- Specific surface area-100 m2/g
- Color: Black
- Purity: 99.9%
- Average flake thickness: 8 nm (20-30 monolayers)
- Average Particle (lateral) size: ~ 550 nm (150-3000) nm.

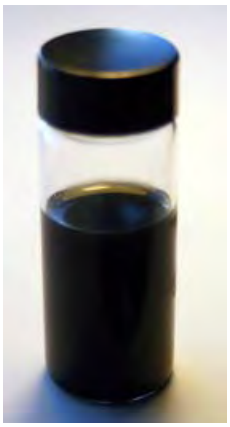
Typical SEM images of dry nanopowder:





Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Dispersible in DMF and alcohols: Solution in DMF

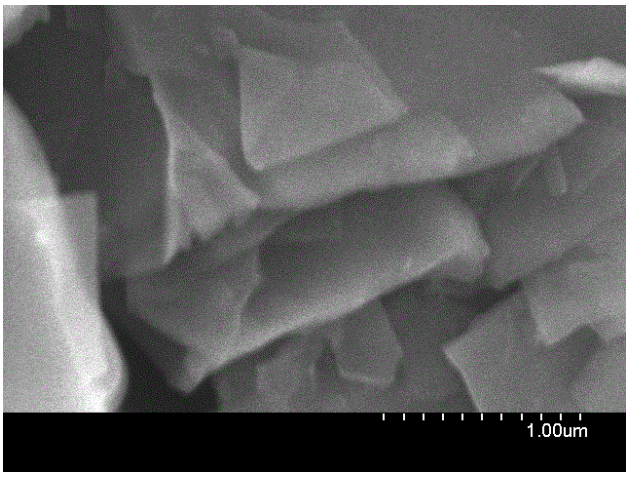


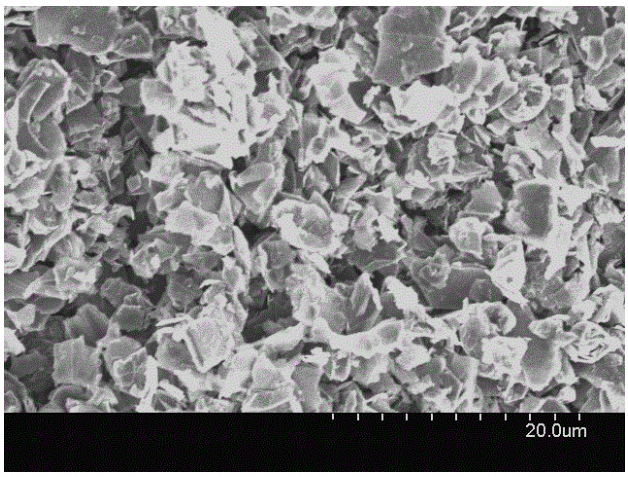
VI) Graphene Nanopowder: 8 nm Flakes- 25 g

Specifications:

- Specific surface area-100 m2/g
- Color: Black
- Purity: 99.9%
- Average flake thickness: 8 nm (20-30 monolayers)
- Average Particle (lateral) size: ~ 550 nm (150-3000) nm.

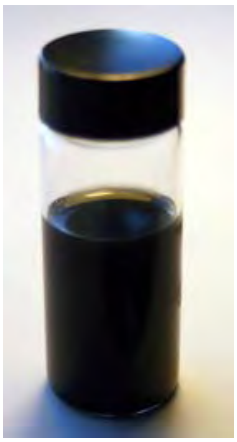
Typical SEM images of dry nanopowder:





Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metalic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Dispersible in DMF and alcohols: Solution in DMF

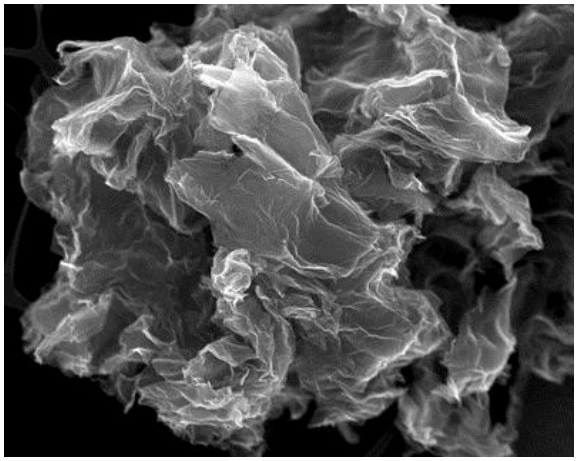


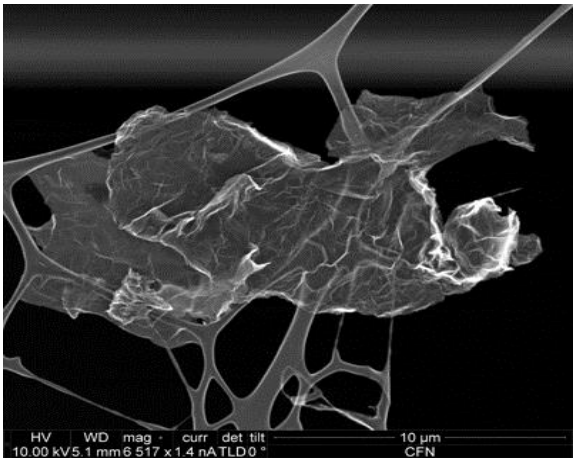
VII) High Surface Area Reduced Graphene Oxide 75 mg

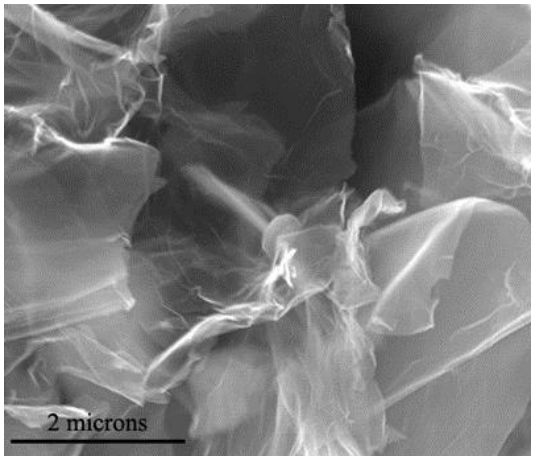
Specifications:

- Specific surface area-833 m2/g
- Color: Black
- Solid content: 98%
- Carbon/Oxygen Ratio 10.5
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-5 microns.

Typical SEM images of dry nanopowder:







Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

b) Graphene Nanopowder: 10 nm or thicker

I) Carbon Nanohorns: 0.25 grams

Carbon Nanohorns are made of graphene sheets which are wrapped and form cone shapes. One end of the cone is capped similar to a fullerene. Each cone is 30-50 nm in length and 2-5 nm in diameter. These cones tend to group together and form a cluster which can be characterized as nano-stars or nanohorns.

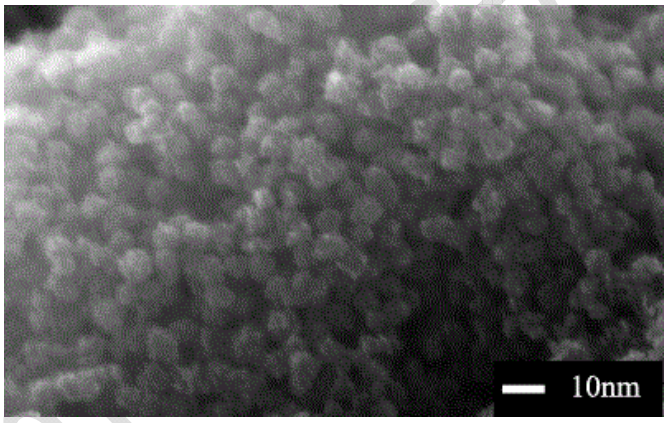
Carbon Nanohorns have many of the same properties as graphene – high electrical and thermal conductivity, as well as ease of functionalization.

This product is in the form of powder and comes in the size of 0.25 grams

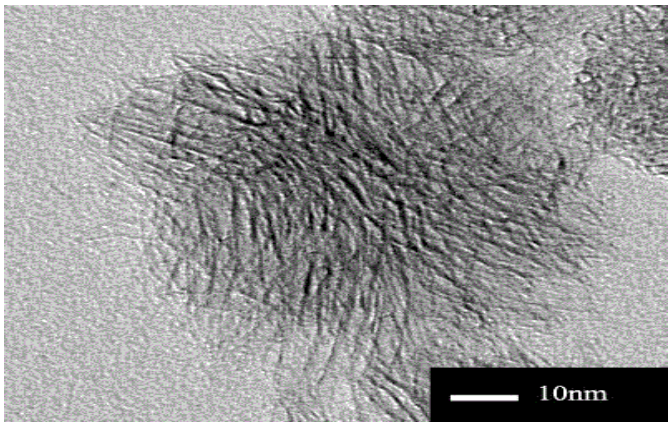
Properties:

- Diameter: 3-5 nm
- Length: 30-50 nm
- Cluster diameter: 60-120 nm
- Density: 1.1 g/cm3
- Bulk density: >15 g/dm3
- Active surface: 250 m2/g

SEM image of Carbon Nanohorns



TEM images of Carbon Nanohorns



II) Graphene Nanopowder Trial kit

Includes:

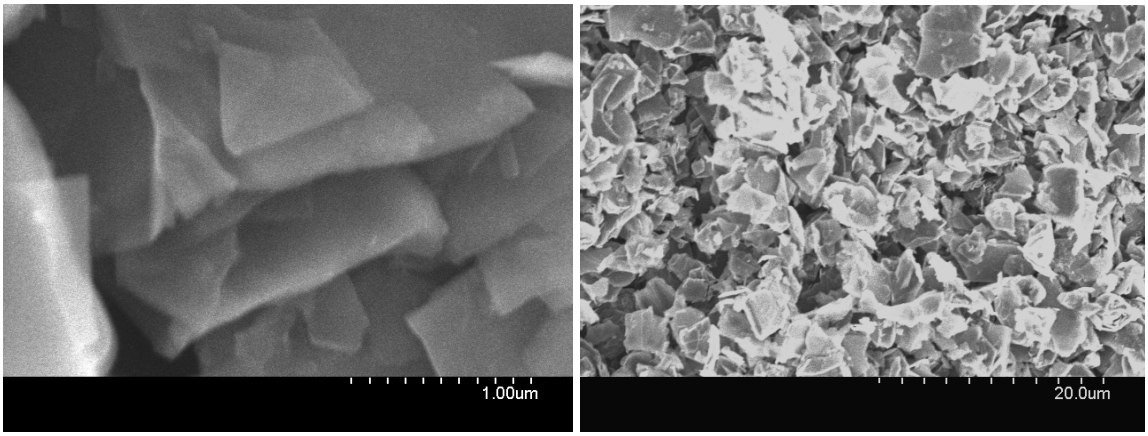
Graphene Nanopowder Grade AO-2, 1 g

Graphene Nanopowder Grade AO-3, 5 g

Graphene Nanopowder Grade AO-4, 5 g

Graphene Nanopowder Grade C-1, 5 g

Typical SEM images of AO-2 dry nanopowder:



Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

III) Graphene Nanopowder: 12 nm Flakes-100 g

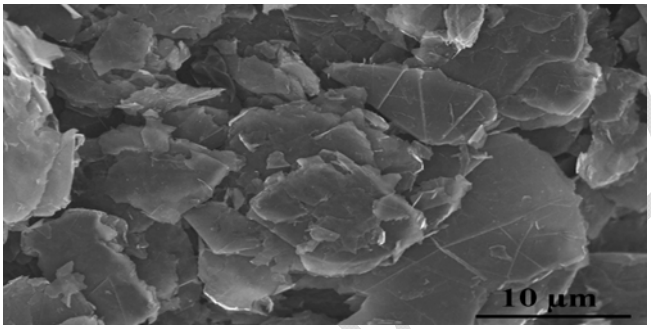
100 g (dry powder)
Grade AO-3

Specifications:

- Specific surface area-80 m/g2
- Color: Black
- Purity: 99.2%
- Average flake thickness: 12 nm (30-50 monolayers)
- Average Particle (lateral) size: ~ 4500 nm (1500-10000) nm.

Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Low-cost alternative to AO-1 and AO-2. Interested in high volume orders? Contact us for details.



IV) Graphene Nanopowder: 12 nm Flakes-25 g

25 g (dry powder)

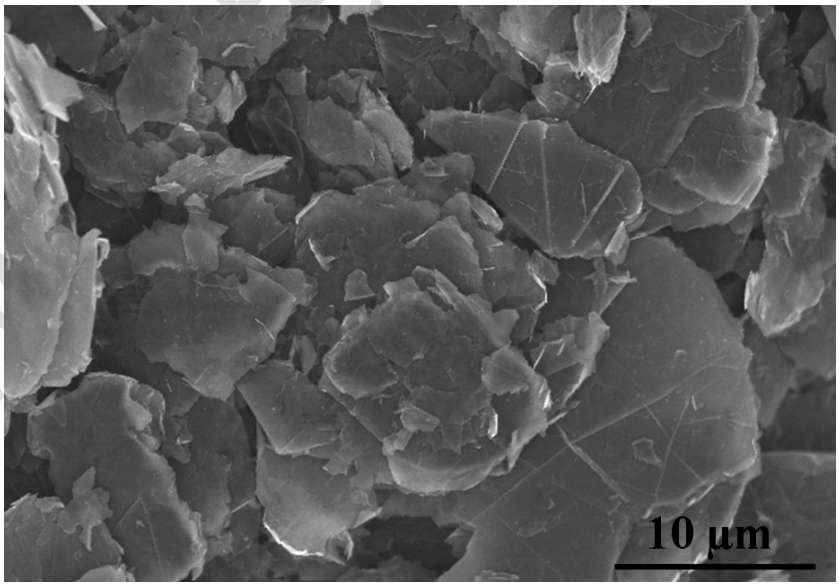
Grade AO-3

Specifications:

- Specific surface area-80 m/g2
- Color: Black
- Purity: 99.2%
- Average flake thickness: 12 nm (30-50 monolayers)
- Average Particle (lateral) size: ~ 4500 nm (1500-10000) nm.

Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metalic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Low-cost alternative to AO-1 and AO-2. Interested in high volume orders? Contact us for details.



V) 5 g (dry powder)

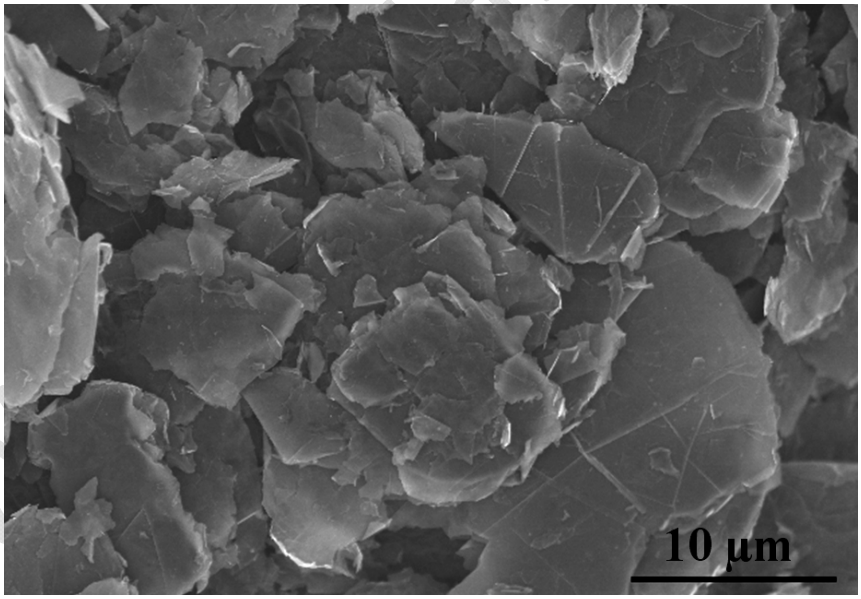
Grade AO-3

Specifications:

- Specific surface area-80 m/g2
- Color: Black
- Purity: 99.2%
- Average flake thickness: 12 nm (30-50 monolayers)
- Average Particle (lateral) size: ~ 4500 nm (1500-10000) nm.

Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metalic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Low-cost alternative to AO-1 and AO-2



VI) Graphene Nanopowder: 60 nm Flakes- 25 g

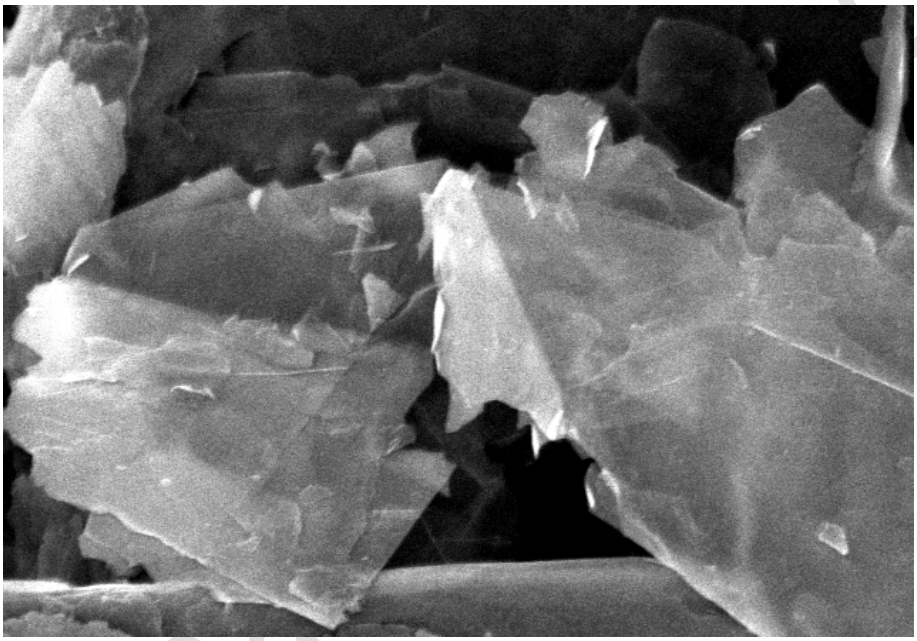
25 g (dry powder)

Grade AO-4

Specifications:

- Specific surface area<15 m2/g
- Color: Black
- Purity: 98.5%
- Average flake thickness: 60 nm
- Particle (lateral) size: ~ 3-7 microns.

Typical SEM images of dry nanopowder:



Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metalic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research
- Dispersible in DMF and alcohols: Solution in DMF

VII) Graphene Nanopowder: 60 nm Flakes-100 g

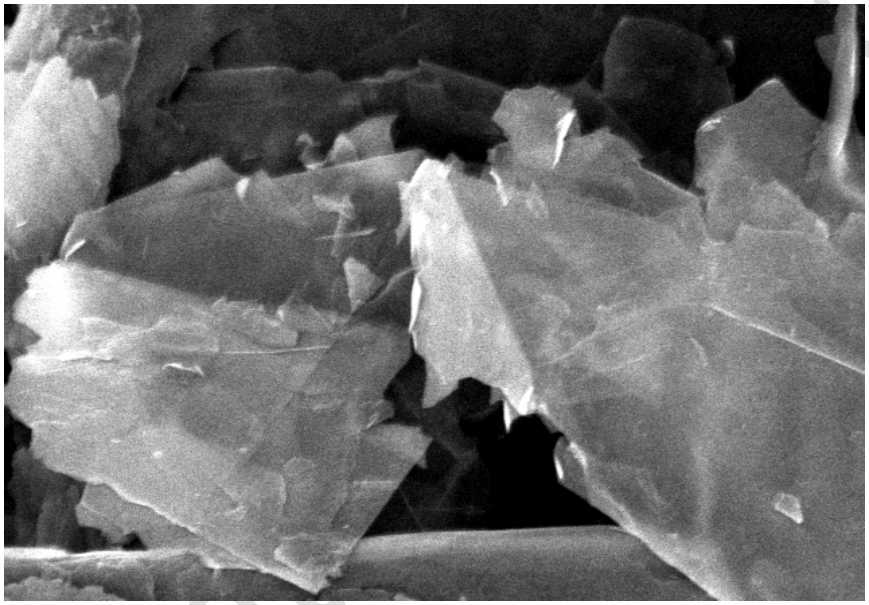
100 g (dry powder)

Grade AO-4

Specifications:

- Specific surface area<15 m2/g
- Color: Black
- Purity: 98.5%
- Average flake thickness: 60 nm
- Particle (lateral) size: ~ 3-7 microns.

Typical SEM images of dry nanopowder:



Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metalic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

VIII) Graphene Nanopowder: Grade C1

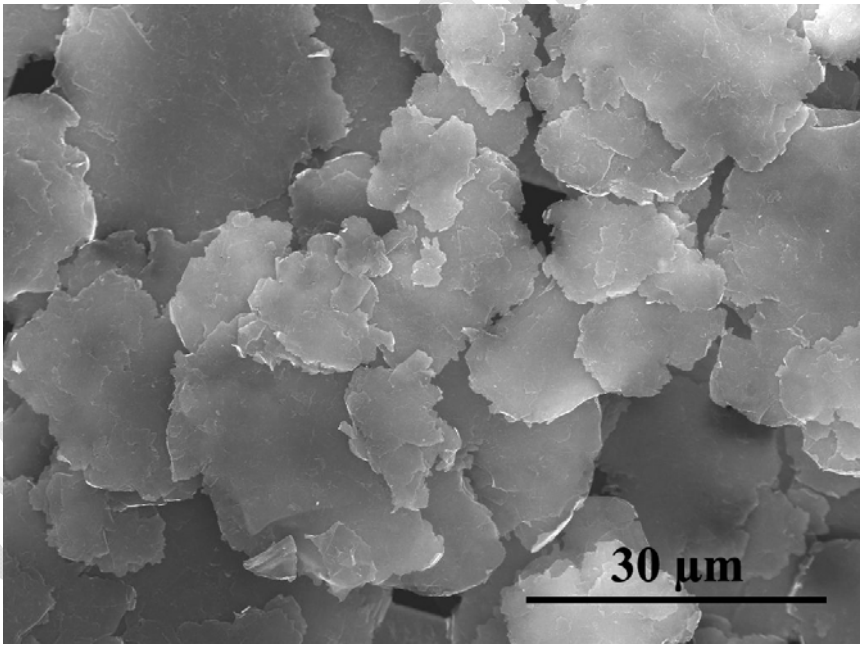
Grade C1

Specifications:

- Specific surface area-60 m/g2
- Color: Black
- Purity: 97%
- Average flake thickness: 5-30nm
- Average Particle (lateral) size: ~ 5-25 microns.

Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research



IX) Graphene Oxide Paper

Graphene Oxide Paper

Parameters

- Diameter: 4.0cm
- Thickness: 10 microns
- Non-conductive
- Tensile modulus> 20 GPa
- Color: Black
- Bends easily

c) Carbon Nanohorns

Carbon Nanohorns are made of graphene sheets which are wrapped and form cone shapes. One end of the cone is capped similar to a fullerene. Each cone is 30-50 nm in length and 2-5 nm in diameter. These cones tend to group together and form a cluster which can be characterized as nano-stars or nanohorns.

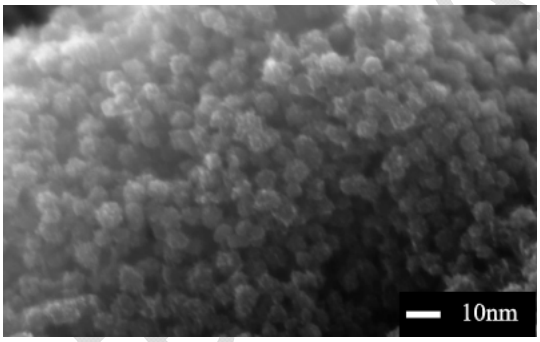
Carbon Nanohorns have many of the same properties as graphene – high electrical and thermal conductivity, as well as ease of functionalization.

This product is in the form of powder and comes in the size of 0.25 grams

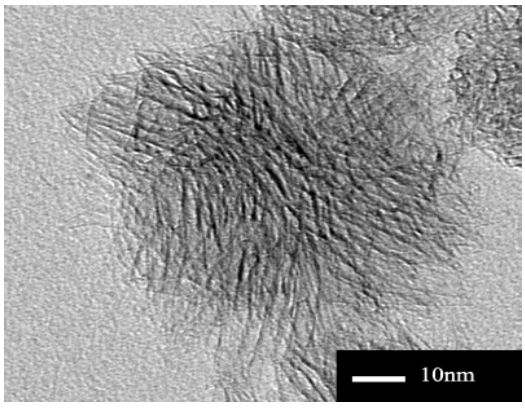
Properties:

- Diameter: 3-5 nm
- Length: 30-50 nm
- Cluster diameter: 60-120 nm
- Density: 1.1 g/cm3
- Bulk density: >15 g/dm3
- Active surface: 250 m2/g

SEM image of Carbon Nanohorns



TEM images of Carbon Nanohorns



d) Granulated Graphene

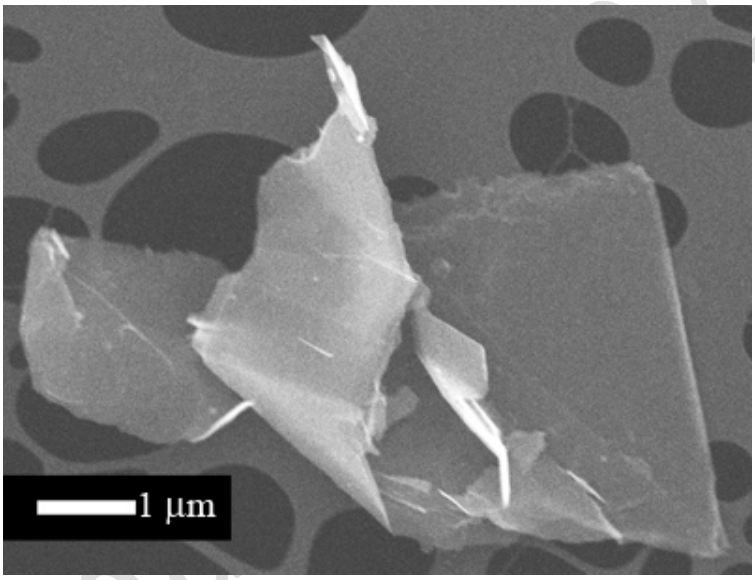
I) Electrically Conductive Granulated Graphene: 100 Grams

Electrically Conductive Granulated Graphene is easier to handle than standard graphene nanopowders, and offers enhanced electrical conductivity

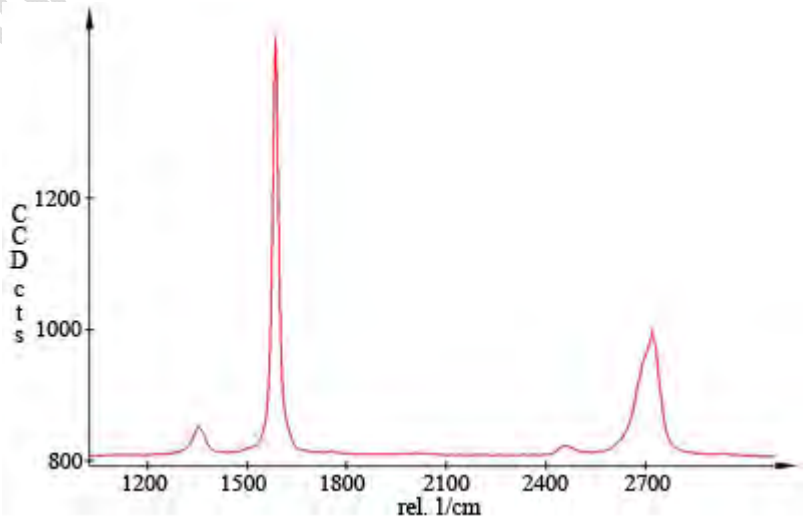
Properties:

- Density0.3g/cm3
- Diameter:5 mm
- Moisture: 0.5%
- Carbon Content: 99.5%
- Granulated Graphene is made by rolling Graphene Nanopowders to create larger pieces of graphene material.

SEM Image of Electrically Conductive Granulated Graphene



Raman Spectrum Electrically Conductive Granulated Graphene



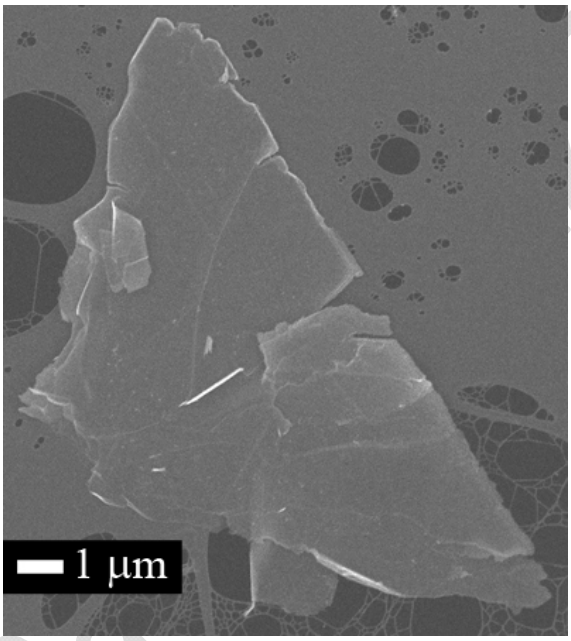
II) Thermally Conductive Granulated Graphene: 100 Grams

Thermally Conductive Granulated Graphene is easier to handle than standard graphene nanopowders, and offers enhanced thermal conductivity

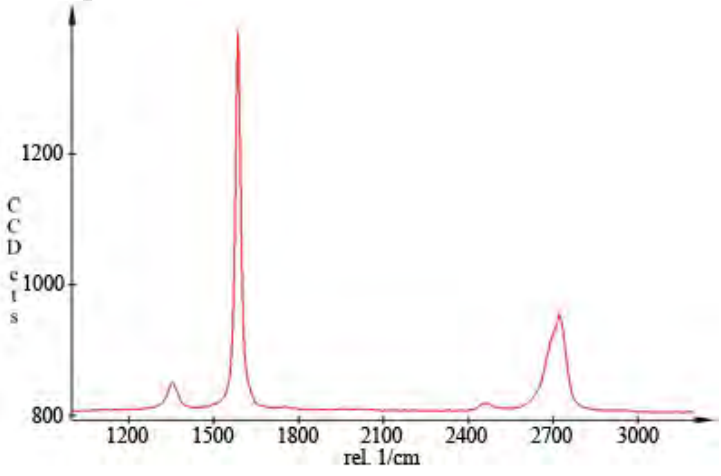
Properties:

- Density0.3g/cm3
- Diameter:5 mm
- Moisture: 0.5%
- Carbon Content: 99.5%
- Granulated Graphene is made by rolling Graphene Nanopowders to create larger pieces of graphene material.

SEM Image of Thermally Conductive Granulated Graphene



Raman Spectrum Thermally Conductive Granulated Graphene



e) Graphene Nanopowder Dispersions

I) Conductive Graphene Dispersion (100 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

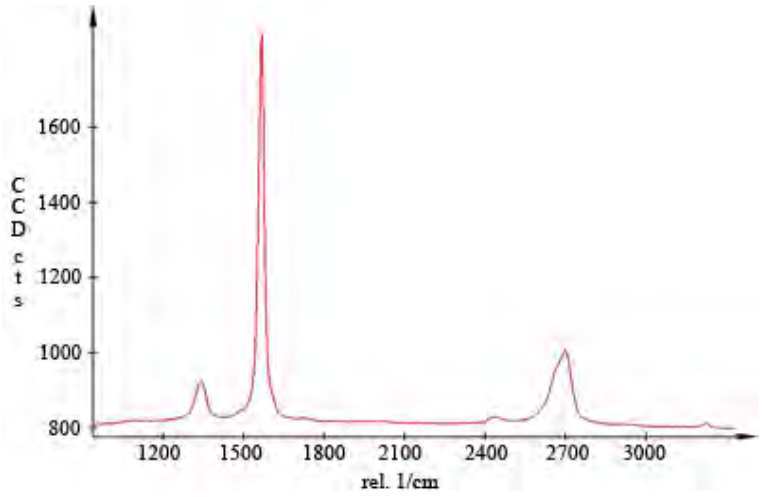
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

Properties

- Graphene Nanoplatelets: Average thickness - 7 nm
- 23 wt% Total graphene content
- Solvent: N-Butyl acetate
- Proprietary dispersant (2%)

Low quantity of defects as confirmed by Raman Spectroscopy

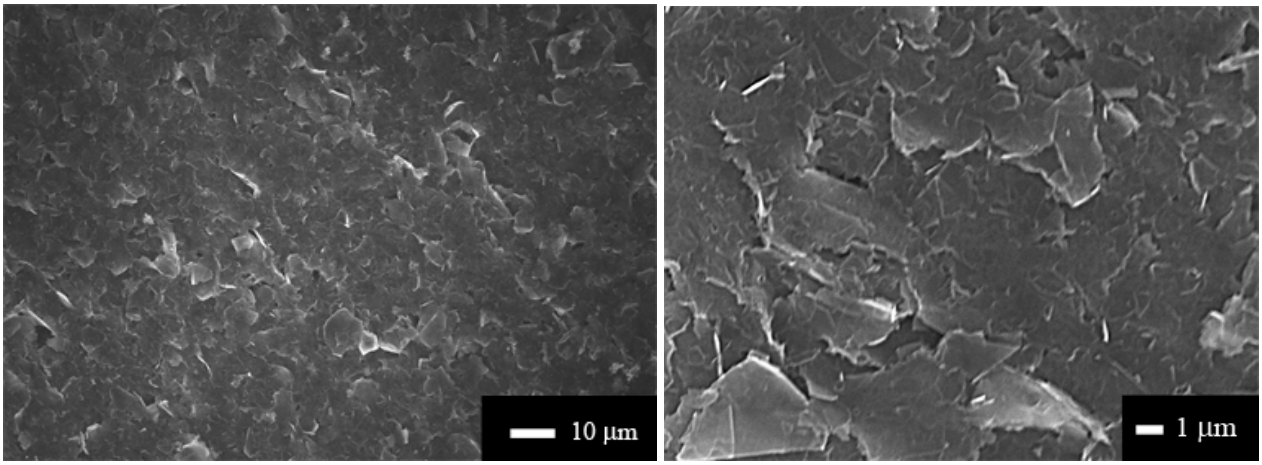


Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.

Films made from this dispersion require 30 minutes of drying time at room temperature.

Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.

SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 ° C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

II) Conductive Graphene Dispersion (200 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

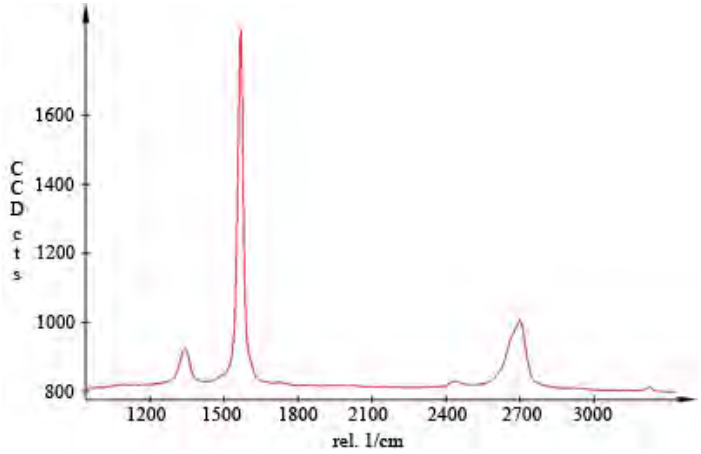
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

Properties

- Graphene Nanoplatelets: Average thickness - 7 nm
- 23 wt% Total graphene content
- Solvent: N-Butyl acetate
- Proprietary dispersant (2%)
- Image of paper coated with our Conductive Graphene Dispersion

Low quantity of defects as confirmed by Raman Spectroscopy

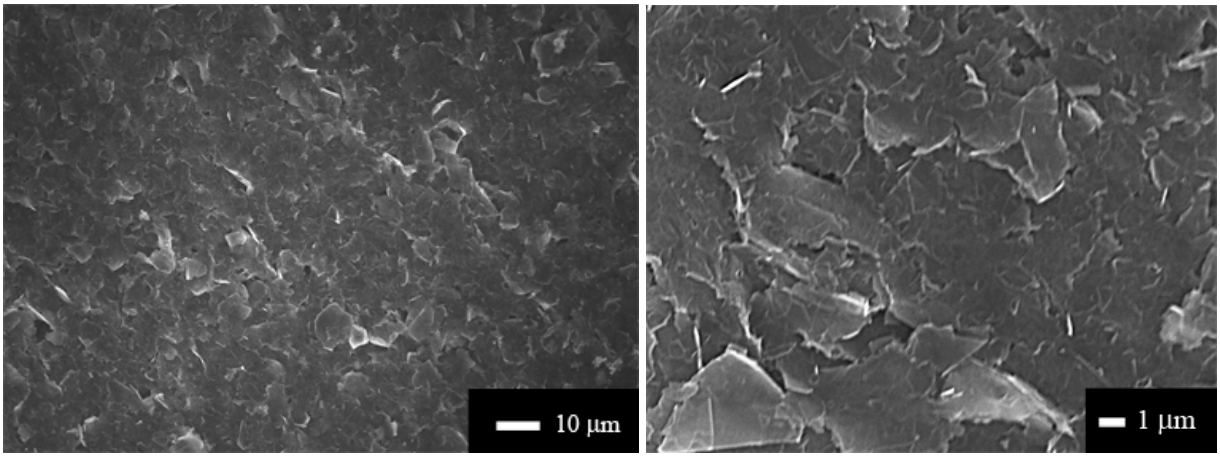


Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.

Films made from this dispersion require 30 minutes of drying time at room temperature.

Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.

SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 °C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

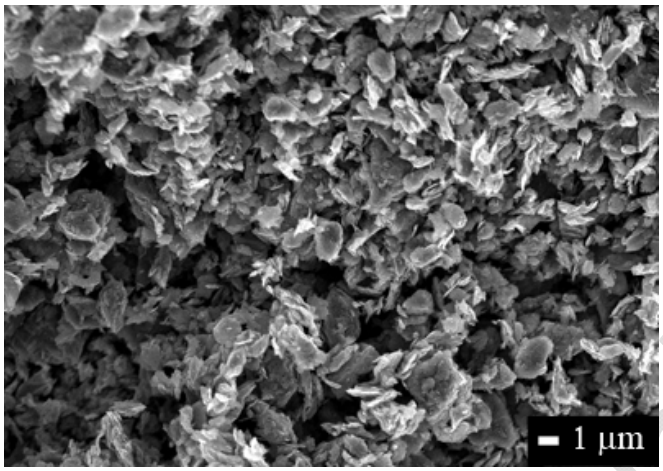
- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

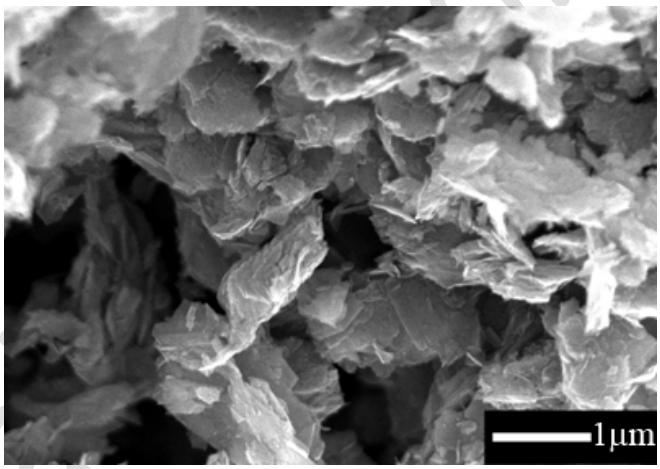
f) Nanostructured Graphite

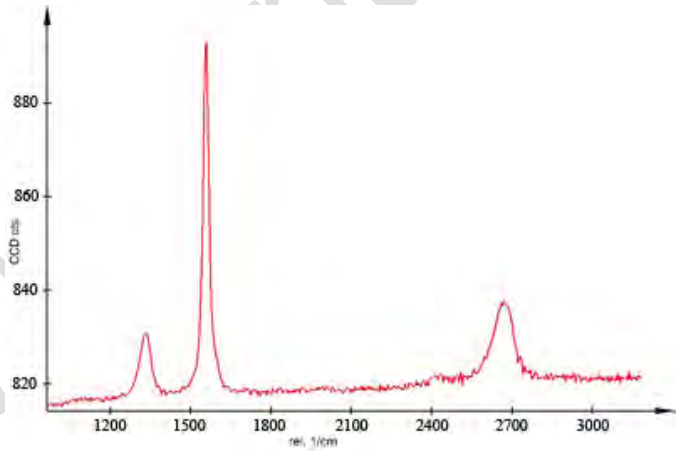
I) Nanostructured Graphite-250

Properties:

- Specific Surface Area: 250 m2/g
- Lateral Size: 100 nm-500 nm
- Thickness: 10-300 nm
- 25 Grams
- Ultrafine Natural Nanographite is a high surface area material, produced by splitting of natural graphite. There is no oxidation or use of surfactants.







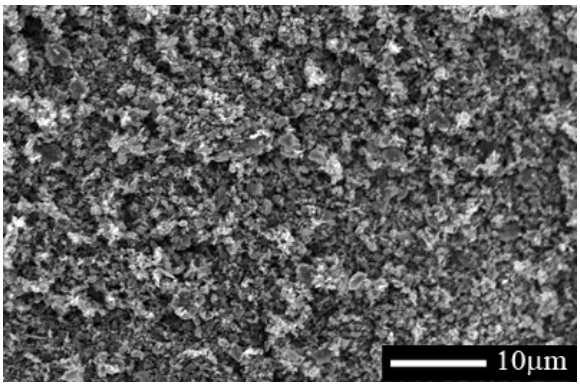
Applications:

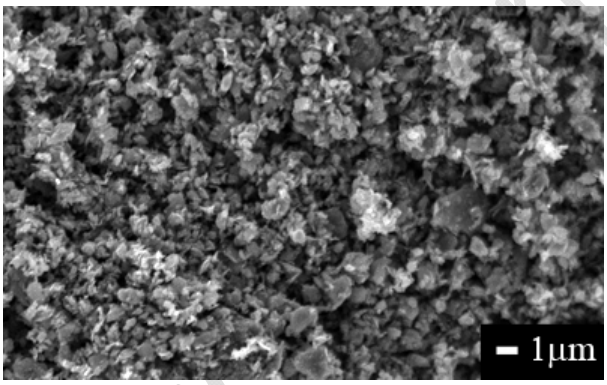
- Composite Materials
- Electrically and Thermally Conductive Composites
- Conductive Coatings
- Aerospace Industry
- Fire Retardants
- Support for Metallic Catalysts
- Low Permeability Materials
- Electro-static Dissipation (ESD) Films
- Chemical and Bio Sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

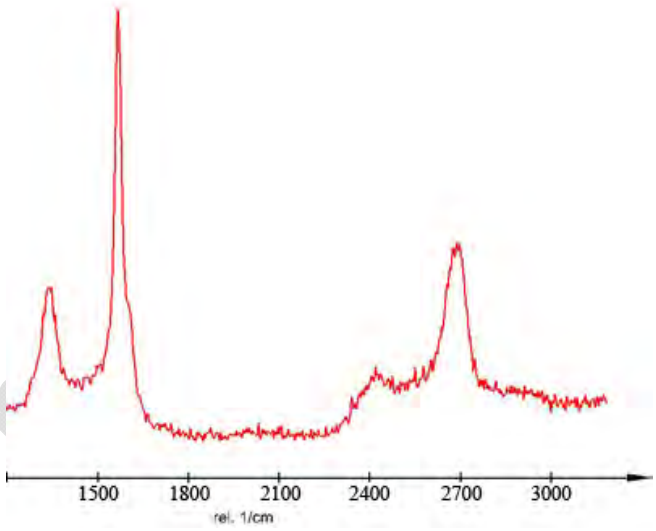
II) Nanostructured Graphite-400

Properties:

- Specific Surface Area: 400 m2/g
- Lateral Size: 100 nm-500 nm
- Thickness: 10-300 nm
- 25 Grams
- Ultrafine Natural Nanographite is a high surface area material, produced by splitting of natural graphite. There is no oxidation or use of surfactants**.**





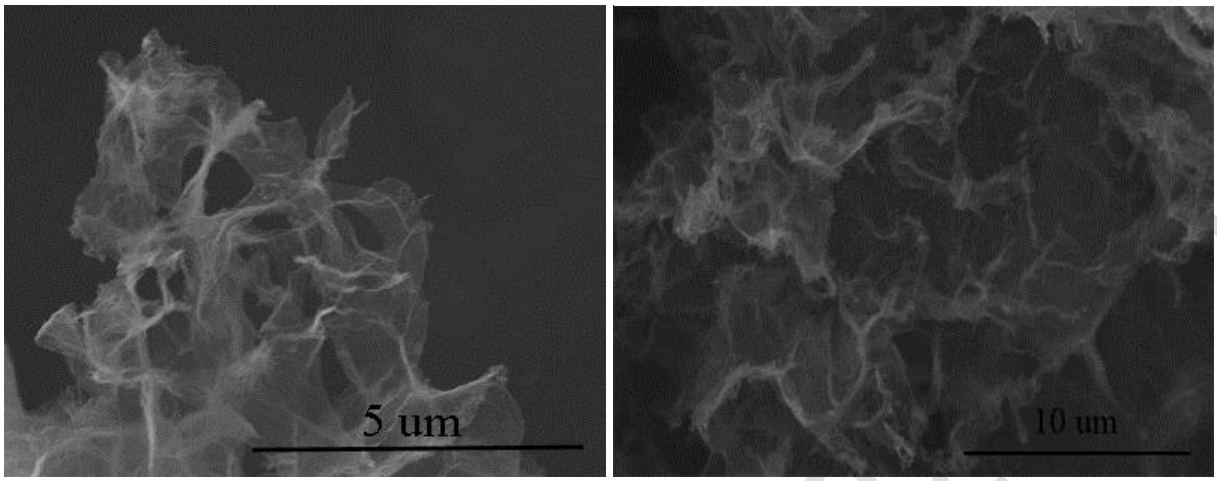


Applications:

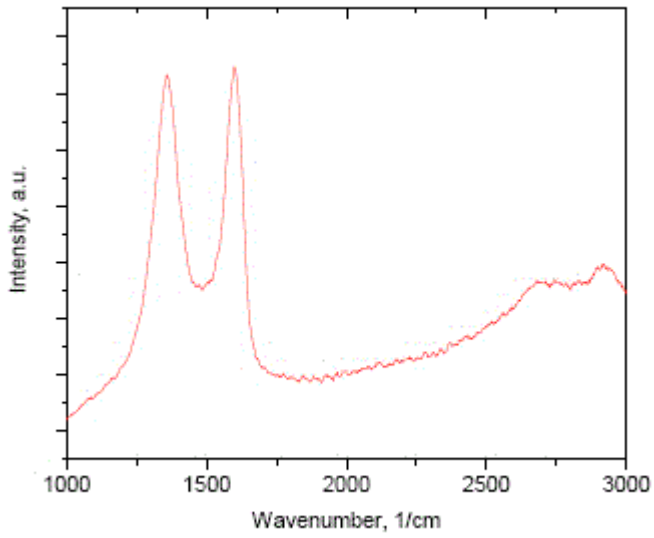
- Composite Materials
- Electrically and Thermally Conductive Composites
- Conductive Coatings
- Aerospace Industry
- Fire Retardants
- Support for Metallic Catalysts
- Low Permeability Materials
- Electro-static Dissipation (ESD) Films
- Chemical and Bio Sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

g) Reduced Graphene Oxide

I) High Porosity Reduced Graphene Oxide-0.25G



Raman Spectrum



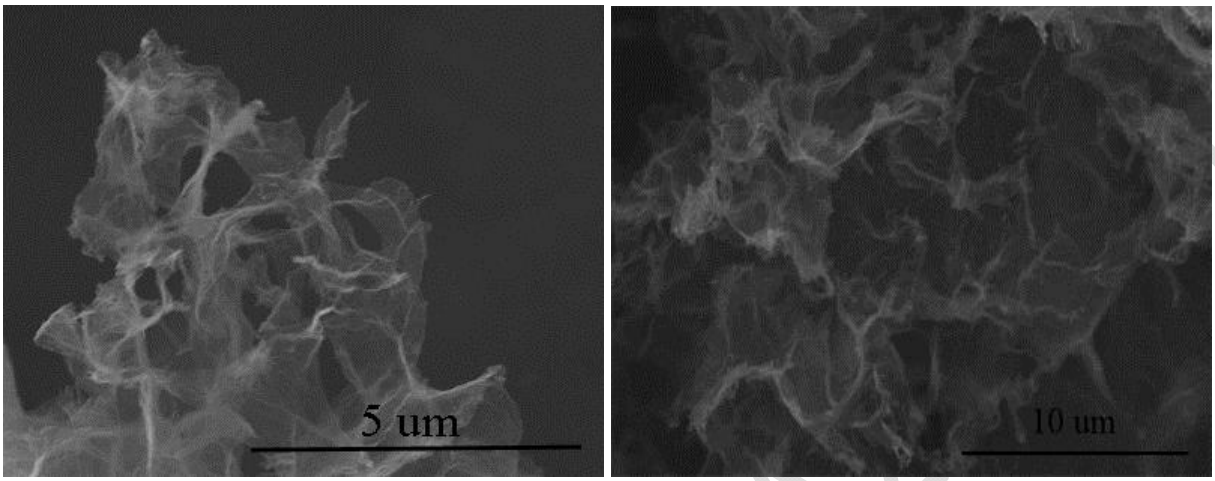
Specifications:

- Specific surface area-about 400 m2/g
- Color: Black
- Solid content: 98%
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-10 microns.
- Flakes have multiple openings and holes
- Improved solubility in organic solvents

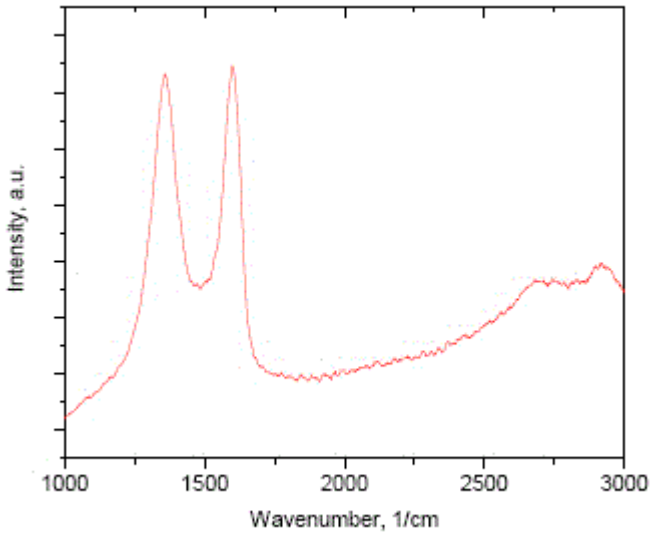
II) High Porosity Reduced Graphene Oxide-0.5G

500 mg (dry black powder)

Typical SEM images



Raman Spectrum



Specifications:

- Specific surface area-about 400 m2/g
- Color: Black
- Solid content: 98%
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-10 microns.
- Flakes have multiple openings and holes
- Improved solubility in organic solvents

III) High Surface Area Reduced Graphene Oxide 75 mg

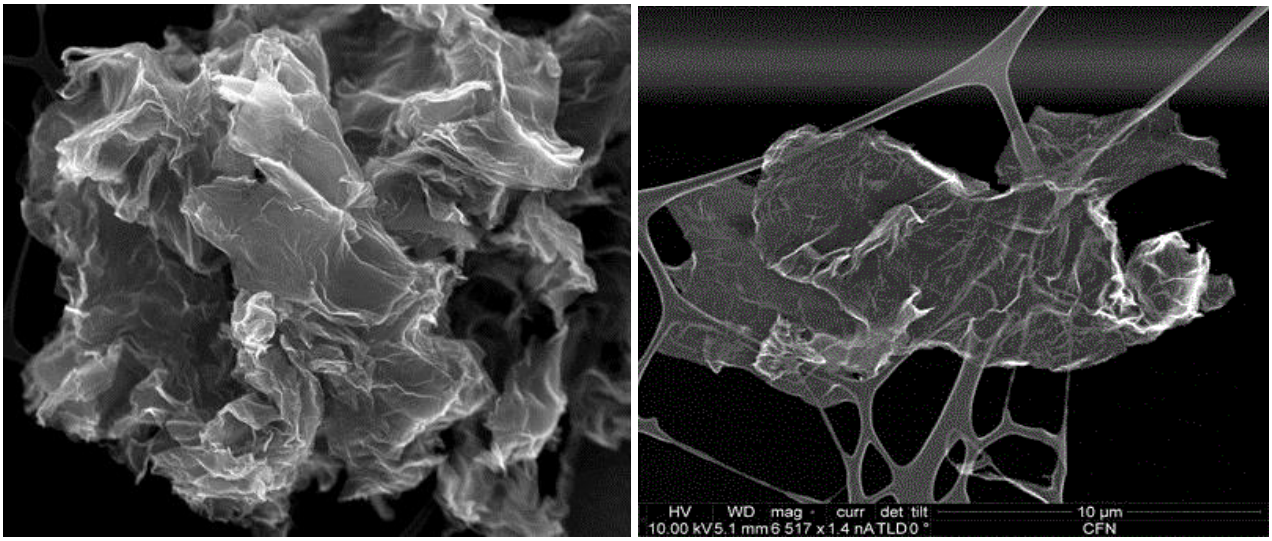
75 mg (dry black powder)

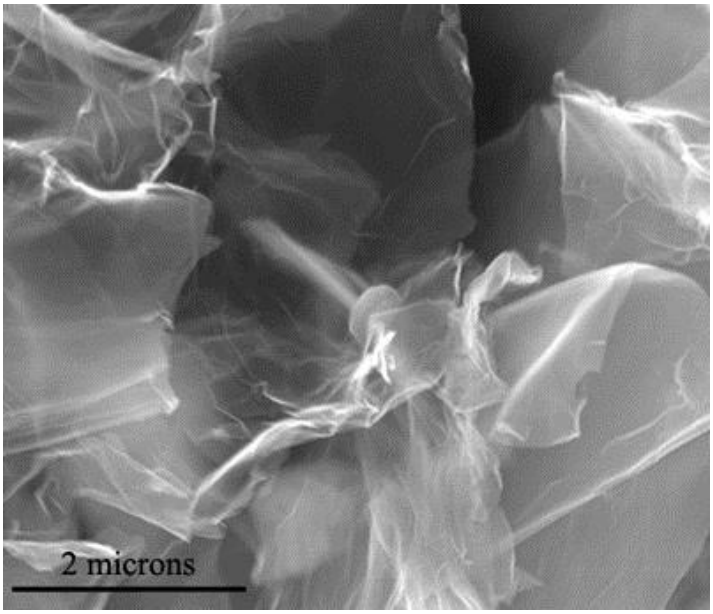
Specifications:

- Specific surface area-833 m2/g
- Color: Black
- Solid content: 98%
- Carbon/Oxygen Ratio 10.5
- Average flake thickness:1 monolayer

Average Particle (lateral) size: ~3-5 microns**.**

Typical SEM images of dry nanopowder:





Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

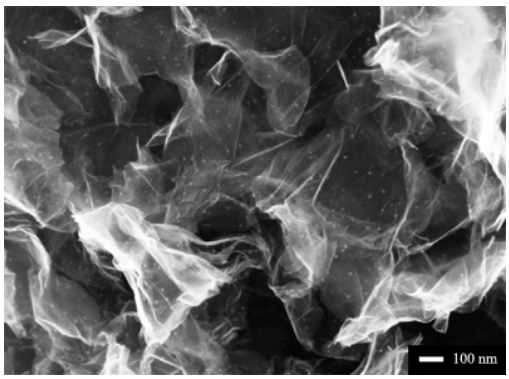
IV) RGO-Pd Powder: 0.2 grams

Reduced Graphene Oxide (RGO) Powder Decorated with Palladium (Pd) Nanoparticles

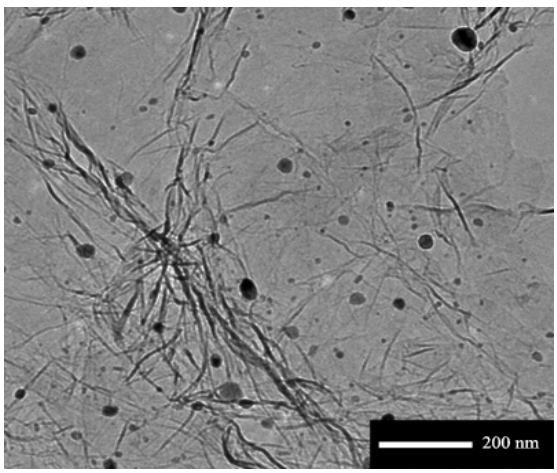
Properties

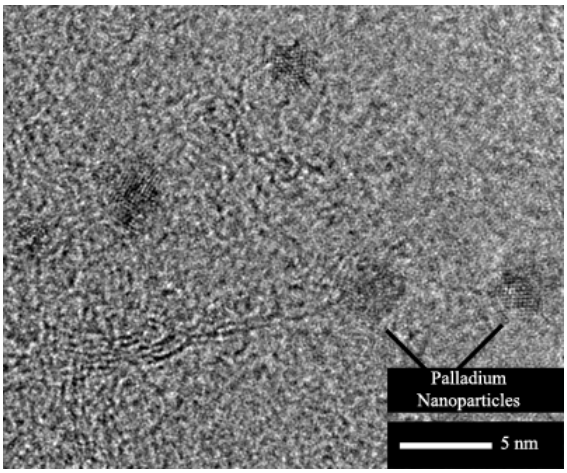
- 3-4% Palladium content
- Particle size: 2-50 nm (broad distribution)
- Form: Powder

SEM Image of RGO with Pd nanoparticles



TEM Images of RGO with Pd nanoparticles





Applications

Perfect for Transmission Electron Microscopy imaging standard
A catalytic material to be used in fuel cells, chemical processing, etc
Graphene-metal hybrid materials

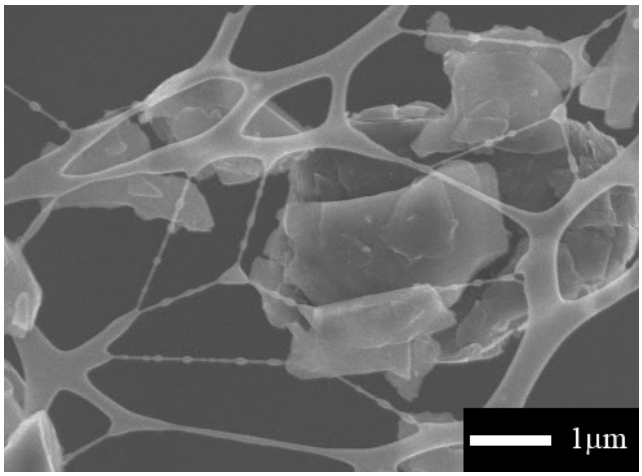
h) Functionalized GNPs

I) Ammonia (NH3) Functionalized Graphene Nanoplatelets - 5 Grams

Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets
Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available
SEM Image of NH3 processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area
- Applications:
- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements
- Chemical Family:
- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

II) Argon Functionalized Graphene Nanoplatelets - 5 Grams

Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials

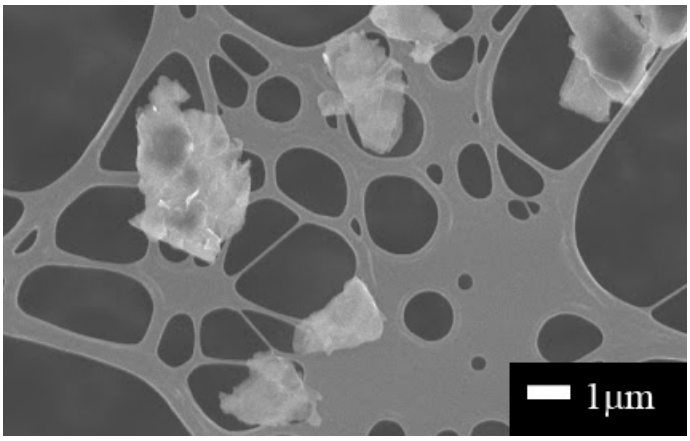
Plasma treatment exfoliates graphene sheets

Haydale's plasma process is suitable for a broad range of commercially available nanomaterials

An accredited and cost efficient solution that maintaints integrity of platelets

Both research and industrial quantities available

SEM Image of Argon processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope

- Plasma functionalised graphene and graphitic nanoplatelets

III) Carboxyl Functionalized Graphene Nanoplatelets - 5 Grams

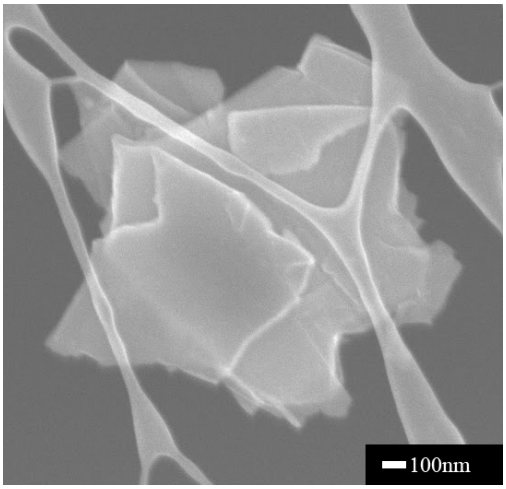
Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available

SEM Image of COOH processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

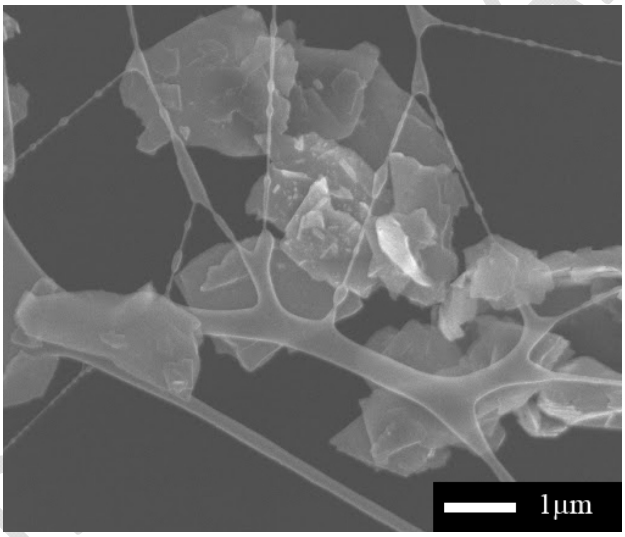
IV) Fluorocarbon Functionalized Graphene Nanoplatelets - 5 Grams

Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available
SEM Image of Fluorocarbon processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

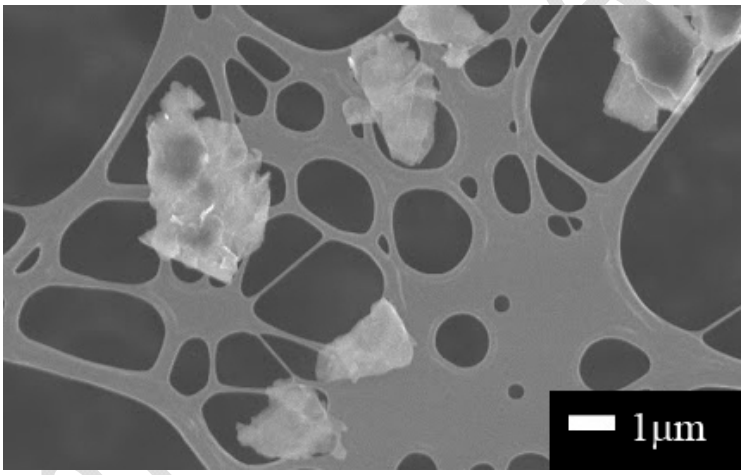
V) Functionalized Graphene Nanoplatelet Trial Kit

Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available
SEM Image of processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

VI) Nitrogen Functionalized Graphene Nanoplatelets - 5 Grams

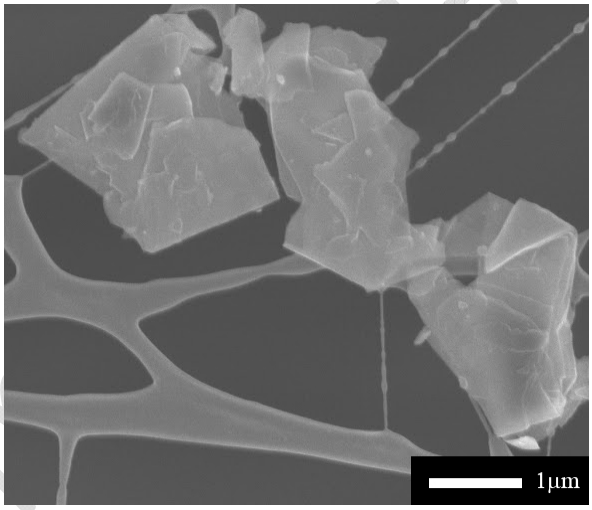
Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available

SEM Image of Nitrogen processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

VII) Oxygen Functionalized Graphene Nanoplatelets - 5 Grams

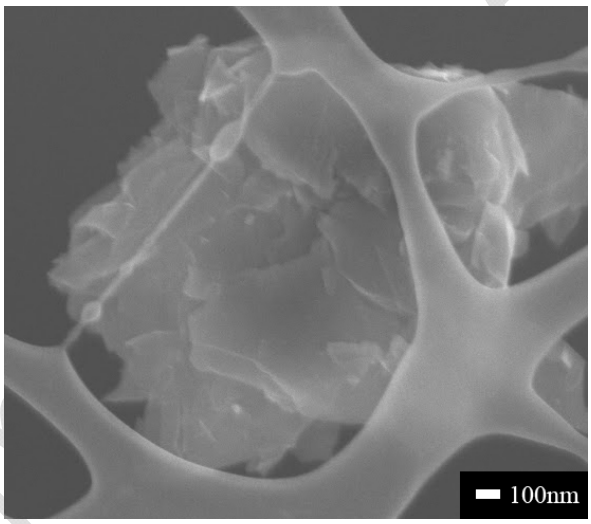
Data	Measurement	Method
Bulk Density	~215 kg/m^3	EN ISO 60
Amorphous Carbon	Not Detected	SEM/TEM
Specific Surface Area	~20 m^2/g	BET Analysis
GNP Planar Size	0.3 - 5 µm	SEM
GNP Thickness	<50 nm	SEM

Individual data available on request

About HDPlasTM Graphene Nanoplatelets

Plasma processed graphitic nanomaterials
Plasma treatment exfoliates graphene sheets
Haydale's plasma process is suitable for a broad range of commercially available nanomaterials
An accredited and cost efficient solution that maintaints integrity of platelets
Both research and industrial quantities available

SEM Image of Oxygen processed Graphene Nanoplatelets



Properties:

- High Mechanical Strength
- High Electrical Conductivity
- High Thermal Conductivity
- High Surface Area

Applications:

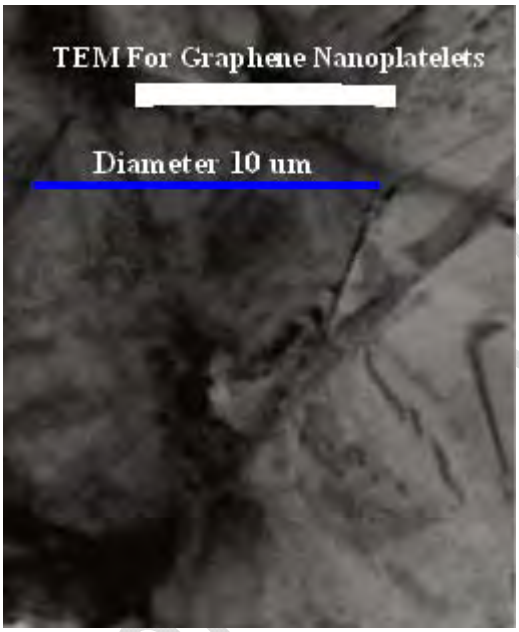
- Mechanical Enhancements
- Thermal Enhancements
- Electrical Enhancements

Chemical Family:

- Carbon Allotrope
- Plasma functionalised graphene and graphitic nanoplatelets

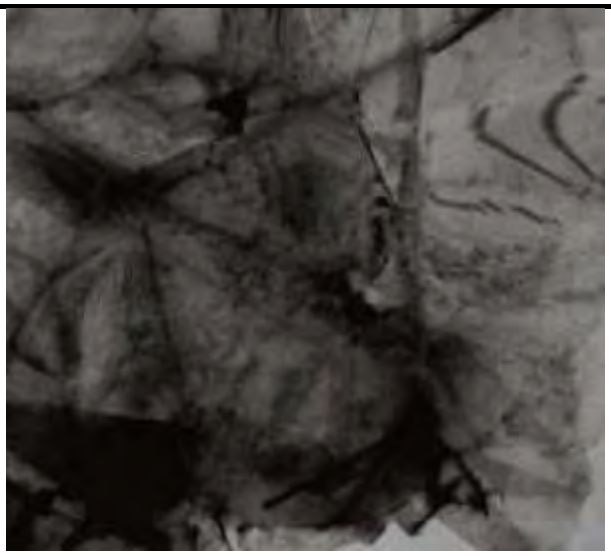
14. Research Grade Graphene Nanoplatelets (99.5+%, Thickness 2-18 nm with Less Than 32 Layers)

Research Grade Graphene Nanoplatelets Powder
Purity: 99.5% - Graphene
Thickness: 2-18nm, Less Than 32 Layers
Ph: 7 - 7.7 (30 oC)
Volume Resistivity: 4x10-4 ohm.cm
Diameter: 4-12um
The Product COA: C=99.7%, O<0.3%



15. Graphene Nanoplatelets / Graphene Nano Powder (95+%, Thickness 2-18 nm with Less Than 32 Layers)

Graphene Nano-Powder
Purity: 95% - Graphene
Thickness: 2-18nm, Less Than 32 Layers
Ph: 7 - 7.7 (30 oC)
Volume Resistivity: 4x10-4 ohm.cm
Diameter: 4-12um
The Product COA: C=99.7%, O<0.3%



16. Graphene NanoPowder 1-5nm

Product #: 0540DX
Graphene NanoPowder (C, 1-5 nm)

Appearance: Black powder
Thickness: 1-5nm
Average Particle Diameter:< 2micron
Surface Area:750 m2/g
Bulk Density: 0.2 to 0.4 g/cc

17. Graphene NanoPowder 6-8 nm

Product #: 0541DX
Graphene NanoPowder (C, 6-8 nm)

Exfoliated Graphene Nanopowder, Platelets, Pristine
Appearance: Black powder
Thickness: 6-8 nm
Average Particle Diameter: 15 micron
Surface Area: 120-150 m2/g
Carbon: 99.5+%
Electrical Conductivity (siemens/meter): 107 (parallel to surface), 102 (perpendicular to surface)
Thermal Conductivity (watts/meter-K): 3000 (parallel to surface), 6 (perpendicular to surface)

18. Graphene NanoPowder 11-15 nm

Product #: 0544DX
Graphene NanoPowder (C, 11-15 nm)

Exfoliated Graphene Nanopowder, Platelets, Pristine
Appearance: Black powder
Thickness: 11-15 nm
Average Particle Diameter: 15 micron
Surface Area: 50-80 m2/g
Carbon: 99.5+%
Electrical Conductivity (siemens/meter): 107 (parallel to surface), 102 (perpendicular to surface)
Thermal Conductivity (watts/meter-K): 3000 (parallel to surface), 6 (perpendicular to surface)

19. Graphene (Diameter 0.5-3 um, Thickness 0.55~3.74 nm)

Purity: > 99wt%
Diameter: 0.5-3 µm
Thickness: 0.55~3.74 nm
Layers: 1-10
Specific Surface Area: 500-1000 m2/g

20. Single Layer Graphene Flake

Product Number : MKN-SLG-F

CAS Number : 7782-42-5

Formula : C

Product Details

Single Layer Graphene Flake, Reduced
+99% Carbon
Flake size: 0.5-5 microns.
Thickness: Single atomic layer >80%
Color: Black for reduced graphene.

21. Graphene Coatings/Films

a) Conductive Graphene Dispersion (100 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

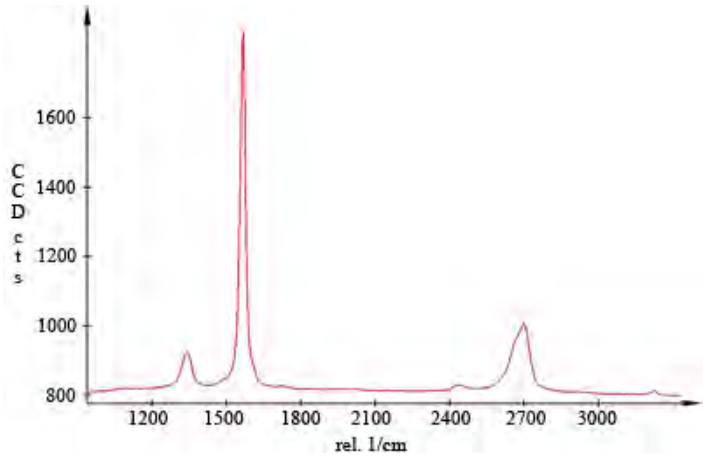
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

Properties

Graphene Nanoplatelets: Average thickness - 7 nm
23 wt% Total graphene content
Solvent: N-Butyl acetate
Proprietary dispersant (2%)

Low quantity of defects as confirmed by Raman Spectroscopy

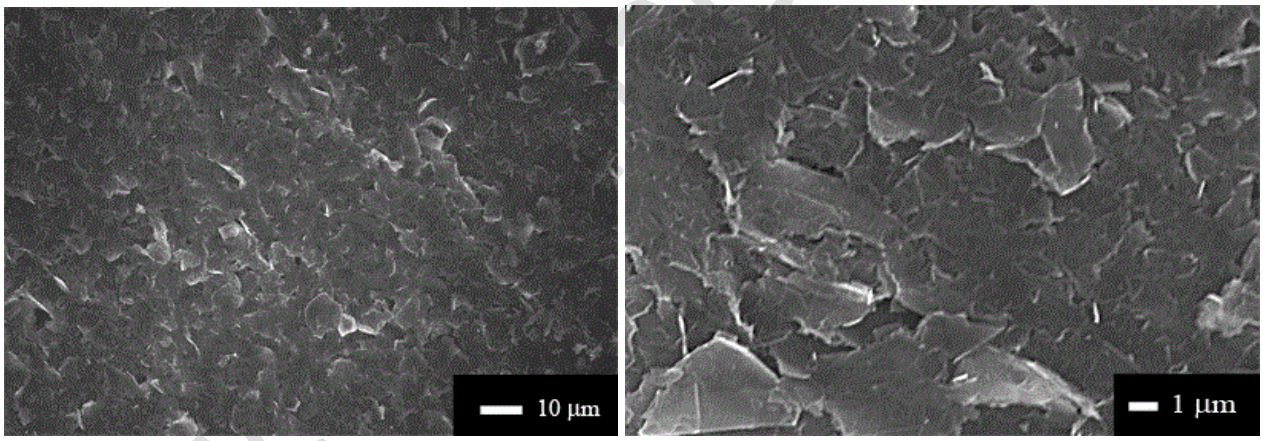


Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.

Films made from this dispersion require 30 minutes of drying time at room temperature.

Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.

SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 ° C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

b) Conductive Graphene Dispersion (200 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

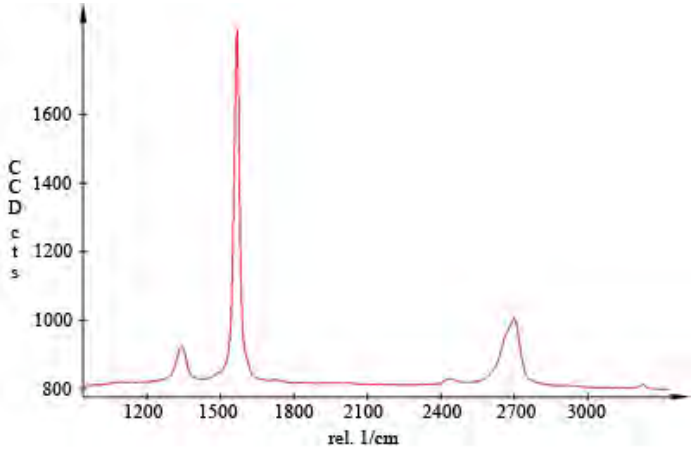
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

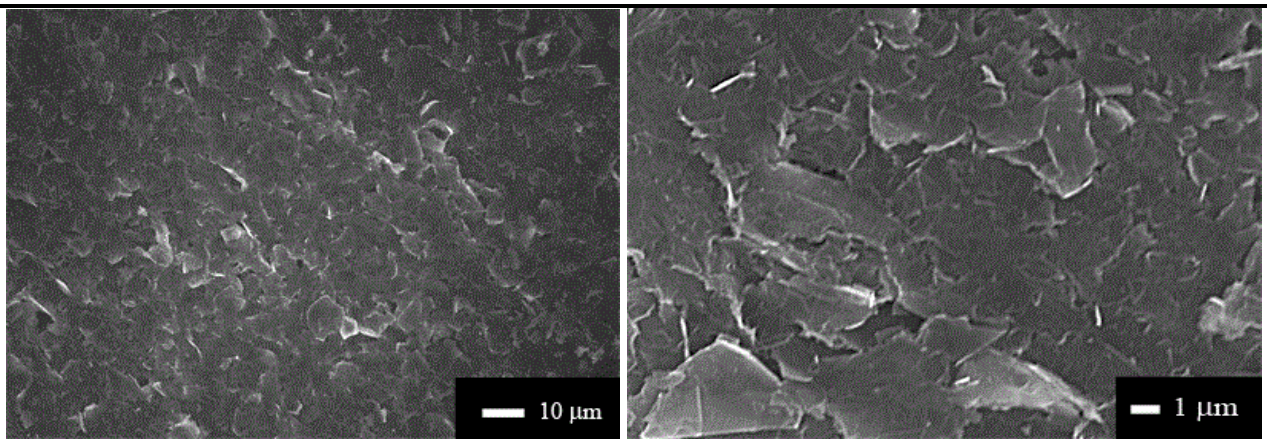
Properties

- Graphene Nanoplatelets: Average thickness - 7 nm
- 23 wt% Total graphene content
- Solvent: N-Butyl acetate
- Proprietary dispersant (2%)

Low quantity of defects as confirmed by Raman Spectroscopy



Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.
Films made from this dispersion require 30 minutes of drying time at room temperature.
Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.
SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 °C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

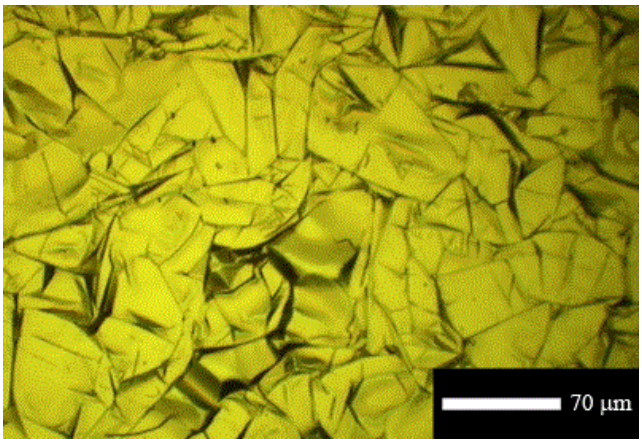
- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

c) Conductive Graphene Sheets, 8"x4"

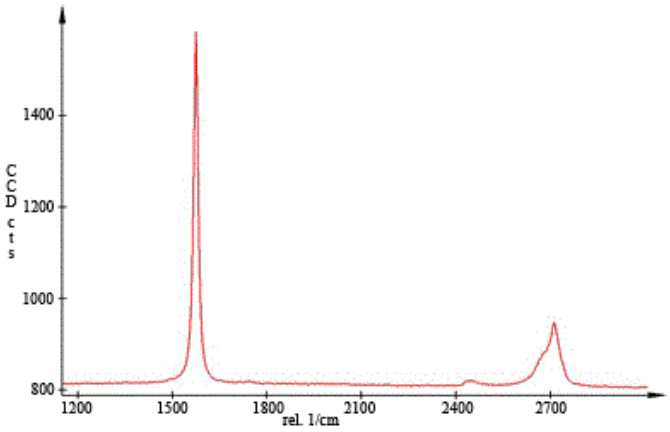
5 pieces of 8"x4" conductive graphene sheets

Properties

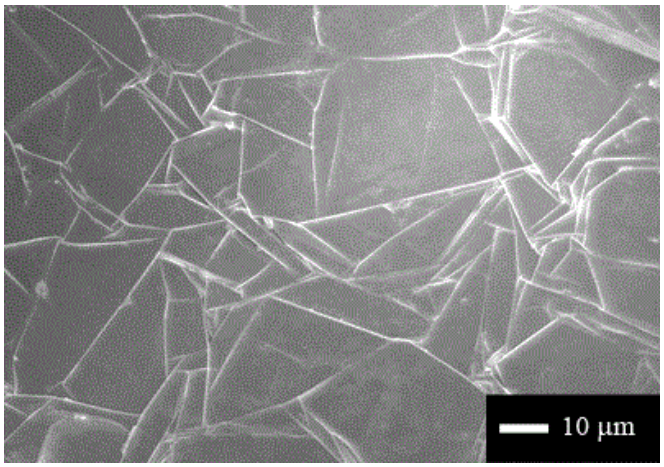
- Size: 8"x4"
- Carbon Content: 97%
- Thickness: 25 micrometers
- Density: 2 g/cm3
- Thermal Conductivity: x-y plane, 1300-1500 W/(m)x(k); z plane, 13-15 W/(m)x(k)
- Tensile Strength: 30 MPa
- Sheet Resistance: 2.8 x 10-2 ohm/square



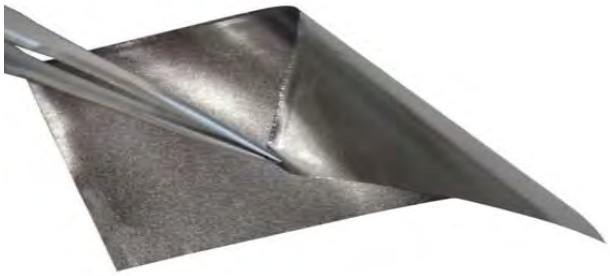
Optical Image of Graphene Sheet



Raman data of Graphene Sheet



SEM image of Graphene Sheet



Applications

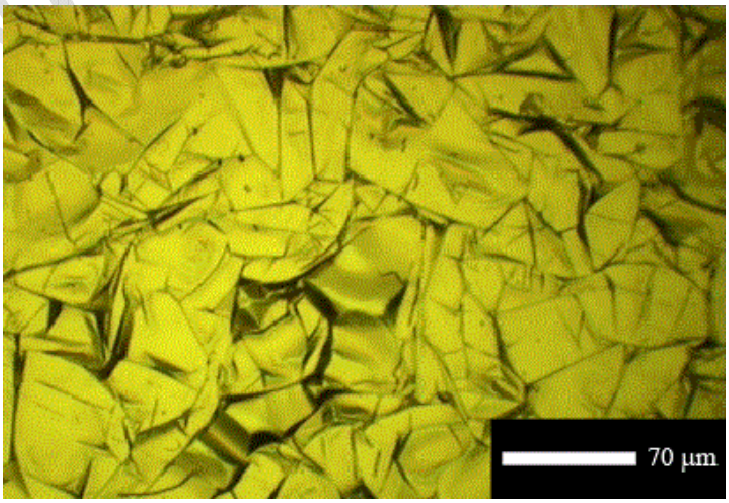
- Thermal Dissipation
- electromagnetic shielding
- These applications are used in devices including: cell phones, laptops, LEDs
- This product can be easily cut with household scissors to fit your needs

d) Conductive Graphene Sheets, 8"x8", 10 pack

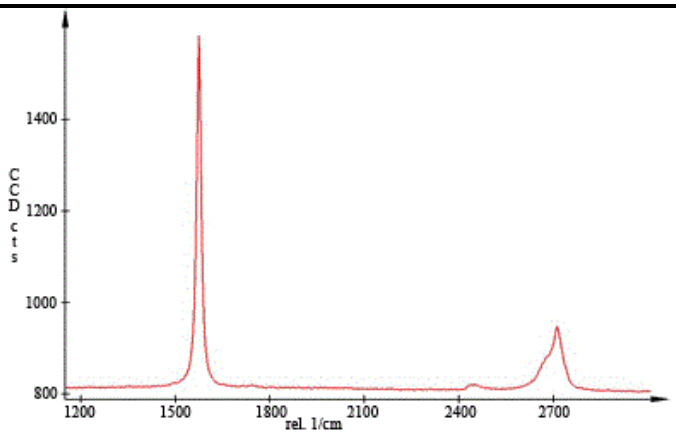
10 pieces of 8"x8" conductive graphene sheets

Properties

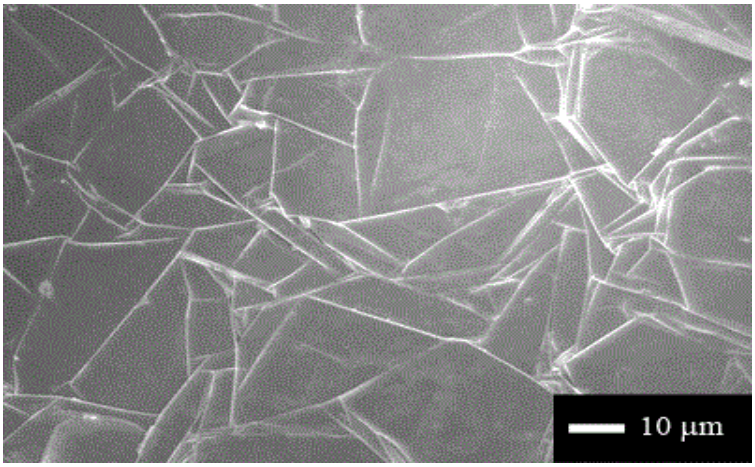
- Size: 8"x8"
- Carbon Content: 97%
- Thickness: 25 micrometers
- Density: 2 g/cm3
- Thermal Conductivity: x-y plane, 1300-1500 W/(m)x(k); z plane, 13-15 W/(m)x(k)
- Tensile Strength: 30 MPa
- Sheet Resistance: 2.8 x 10-2 ohm/square



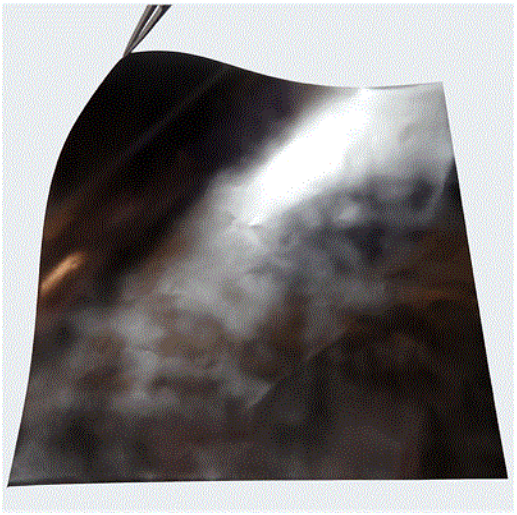
Optical Image of Graphene Sheet



Raman data of Graphene Sheet



SEM image of Graphene Sheet



Applications

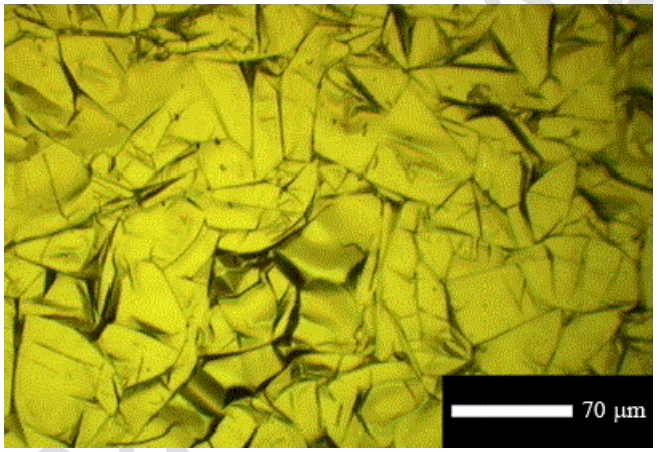
- Thermal Dissipation
- electromagnetic shielding
- These applications are used in devices including: cell phones, laptops, LEDs
- This product can be easily cut with household scissors to fit your needs

e) Conductive Graphene Sheets, 8"x8", 20 pack

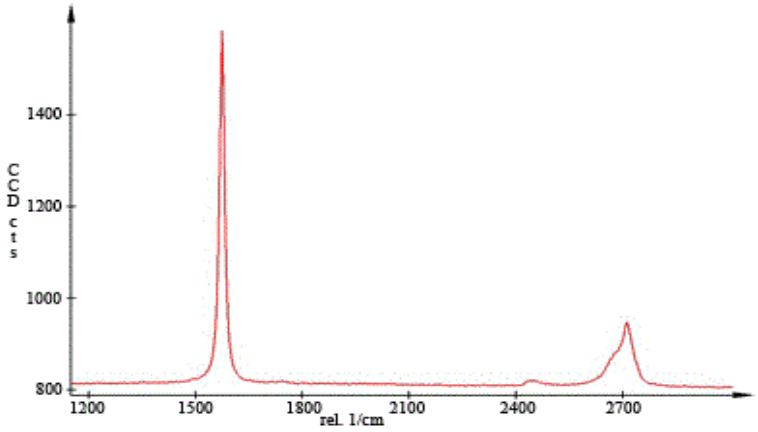
20 pieces of 8"x8" conductive graphene sheets

Properties

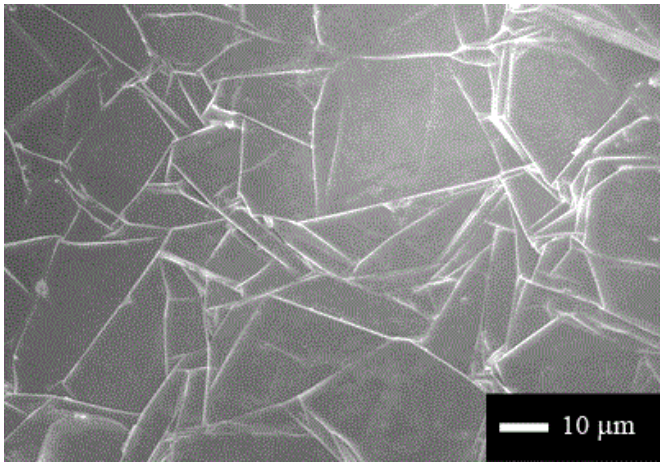
- Size: 8"x8"
- Carbon Content: 97%
- Thickness: 25 micrometers
- Density: 2 g/cm3
- Thermal Conductivity: x-y plane, 1300-1500 W/(m)x(k); z plane, 13-15 W/(m)x(k)
- Tensile Strength: 30 MPa
- Sheet Resistance: 2.8 x 10-2 ohm/square



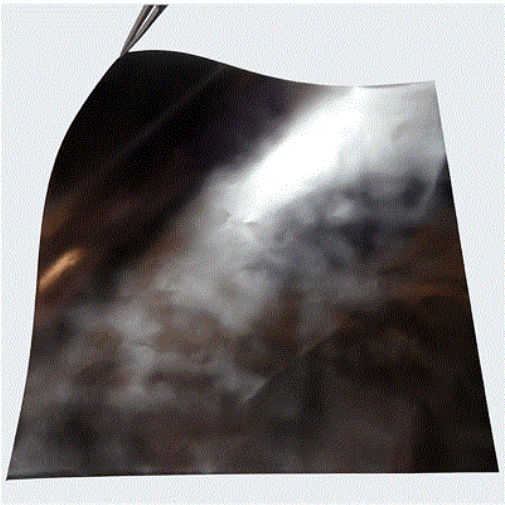
Optical Image of Graphene Sheet



Raman data of Graphene Sheet



SEM image of Graphene Sheet



Applications

- Thermal Dissipation
- electromagnetic shielding
- These applications are used in devices including: cell phones, laptops, LEDs
- This product can be easily cut with household scissors to fit your needs

f) Graphene on Aluminum Foil

Aluminium foil coated with graphene nanoplatelets

9"x8.5"
5 Sheets
Properties of graphene coating:

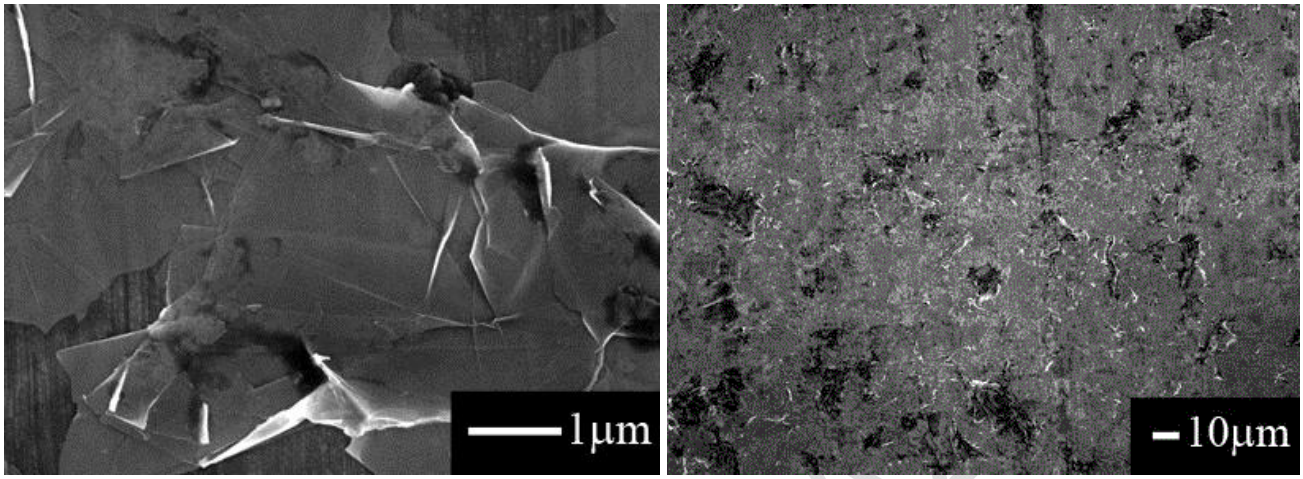
Average Thickness: 3.5nm
Lateral Size of individual graphene flakes: 5-10µm
The flakes coat the surface to form a conductive layer

Properties of aluminum foil:

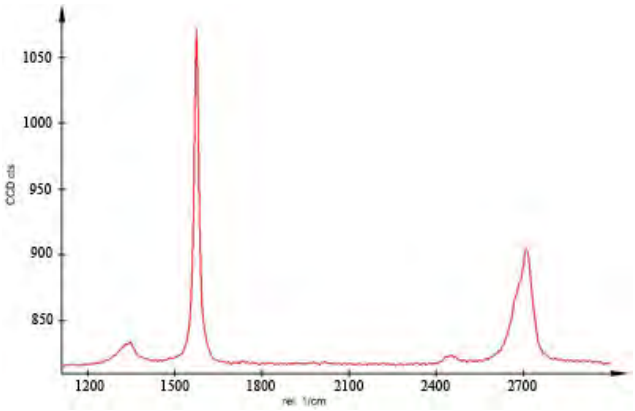
Thickness: 16µm

Electrical Resistivity- 4.5x10-6 Ω.cm
In the lithium ion battery industry -- which includes mobile phones, notebooks, hybrid electric vehicles, etc -- aluminium foil coated with graphite, carbon black, or carbon nanotubes is used as a positive electrode's electron collector. When coated with graphene, the aluminium foil has significantly improved electrical resistivity; aluminum foil coated with graphene is 4.5x10-6 Ω.cm, whereas foil coated with carbon black is 7x10-6 Ω.cm.

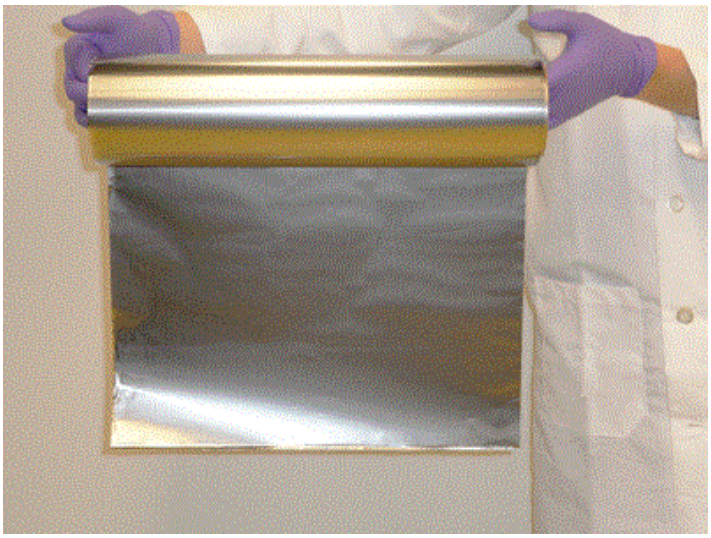
SEM Images of Graphene on Aluminum Foil



Raman Spectrum of Graphene on Aluminum Foil

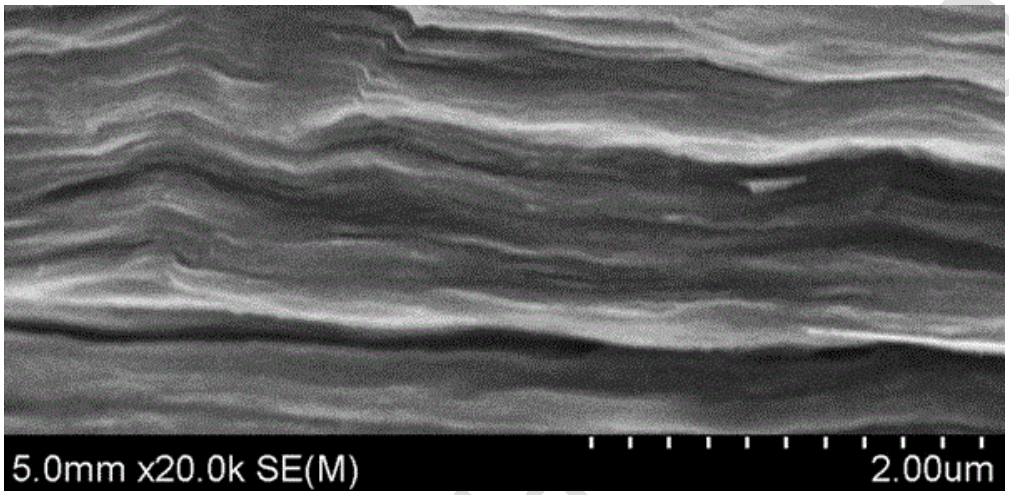


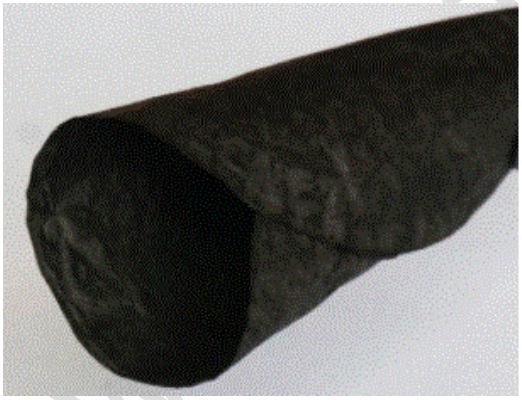
This product may be supplied on a roll - 0.5m width, up to 2000m length

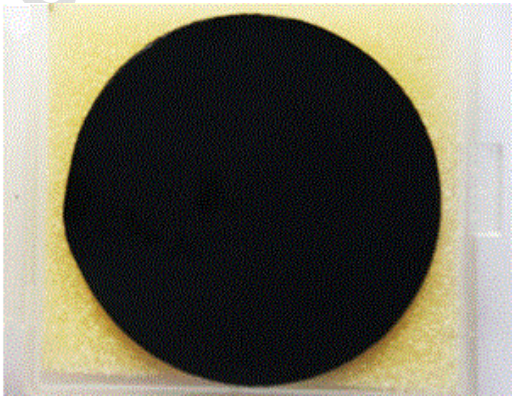


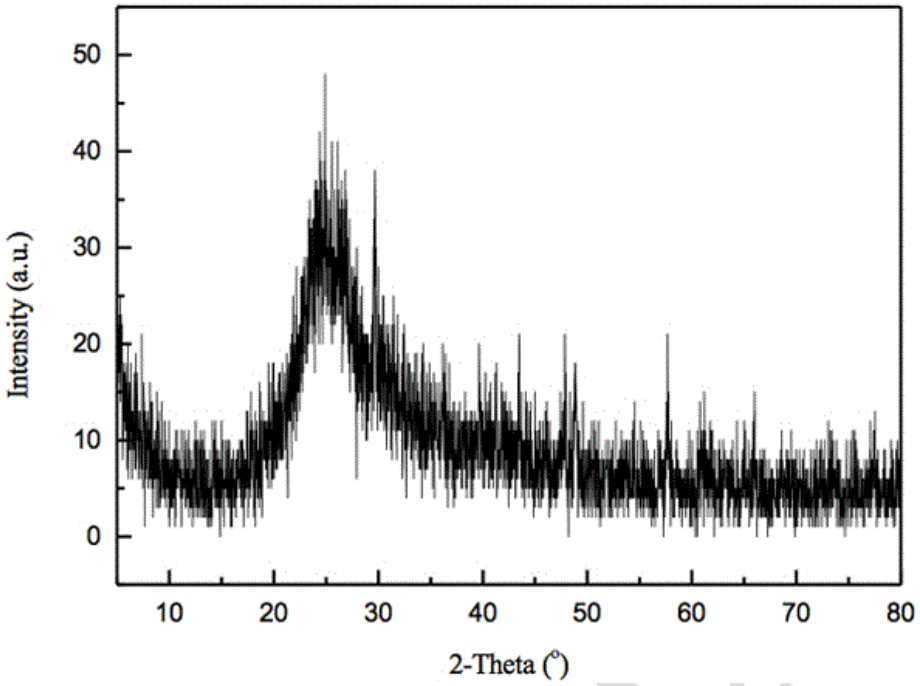
22) Graphene Film-Super Paper

Diameter	40 mm
Thickness	20 µ
Conductive	2x10 ^{3}S/m
Tensile Modulus	> 10 GPa
Color	Black
High Thermal Conductivity	>1000W/m·k
Bends easily, Flexible	









23) Graphene TEM grids

a) 25 pack: CVD Graphene TEM Grid on Copper 2000 support

25 pack: CVD Graphene film deposited on ultrafine copper TEM grids, 2000 Mesh

Availability: In Stock

We use CVD graphene grown on Ni to prepare TEM grids

Thickness of CVD Graphene film: 0.3-2 nm (1-6 monolayers)
Typical graphene coverage:60-90%

Ultrathin CVD Graphene grids provide the ideal specimen support to achieve high resolution data in TEM imaging making them an ideal choice many TEM applications such as:
CVD Graphene grids can be used for the applications:

- Imaging of nanoparticles, proteins, viruses, DNA
- Medical Diagnostics
- Single Cell Studies
- 3D protein imaging
- Drug design
- Imaging of Biological Markers and bio-inspired nanomaterials
- Cryo-transmission electron microscopy, Electron Cry microscopy
- Single Particle Analysis (SPA)
- Materials science and Semiconductor Research
- Electron Energy Loss Spectroscopy (EELS)

b) 25 pack: CVD Graphene TEM Grid on Lacey Carbon Support

25 pack: CVD Graphene film deposited on Lacey carbon TEM grids, 300 Mesh

Availability: In Stock

We use CVD graphene grown on Ni to prepare TEM grids

Thickness of CVD Graphene film: 0.3-2 nm (1-6 monolayers)
Typical graphene coverage: 60-90%

Ultrathin CVD Graphene grids provide the ideal specimen support to achieve high resolution data in TEM imaging making them an ideal choice many TEM applications such as:
CVD Graphene grids can be used for the applications:

- Imaging of nanoparticles, proteins, viruses, DNA
- Medical Diagnostics
- Single Cell Studies
- 3D protein imaging
- Drug design
- Imaging of Biological Markers and bio-inspired nanomaterials
- Cryo-transmission electron microscopy, Electron Cryomicroscopy
- Single Particle Analysis (SPA)
- Materials science and Semiconductor Research
- Electron Energy Loss Spectroscopy (EELS)

c) 5 pack: CVD Graphene TEM Grid on Copper 2000 support

5 Pack: CVD Graphene film deposited on Copper TEM grids (2000 Mesh).

Availability: In Stock

We use CVD graphene grown on Ni to prepare TEM grids

Thickness of CVD Graphene film: 0.3-2 nm (1-6 monolayers)
Typical graphene coverage: 60-90%

Ultrathin CVD Graphene grids provide the ideal specimen support to achieve high resolution data in TEM imaging making them an ideal choice many TEM applications such as:
CVD Graphene grids can be used for the applications:

- Imaging of nanoparticles, proteins, viruses, DNA
- Medical Diagnostics
- Single Cell Studies
- 3D protein imaging
- Drug design
- Imaging of Biological Markers and bio-inspired nanomaterials
- Cryo-transmission electron microscopy, Electron Cryomicroscopy
- Single Particle Analysis (SPA)
- Materials science and Semiconductor Research
- Electron Energy Loss Spectroscopy (EELS)

d) 5 pack: CVD Graphene TEM Grid on Lacey Carbon Support

5 pack: CVD Graphene TEM grids

CVD Graphene film deposited on lacey carbon TEM grids, 300 Mesh.

Availability: In Stock

We use CVD graphene grown on Ni to prepare TEM grids

Thickness of CVD Graphene film: 0.3-2 nm (1-6 monolayers)
Typical graphene coverage: 60-90%

Ultrathin CVD Graphene grids provide the ideal specimen support to achieve high resolution data in TEM imaging making them an ideal choice many TEM applications such as:
CVD Graphene grids can be used for the applications:

- Imaging of nanoparticles, proteins, viruses, DNA
- Medical Diagnostics
- Single Cell Studies
- 3D protein imaging
- Drug design
- Imaging of Biological Markers and bio-inspired nanomaterials
- Cryo-transmission electron microscopy, Electron Cryomicroscopy
- Single Particle Analysis (SPA)
- Materials science and Semiconductor Research
- Electron Energy Loss Spectroscopy (EELS)

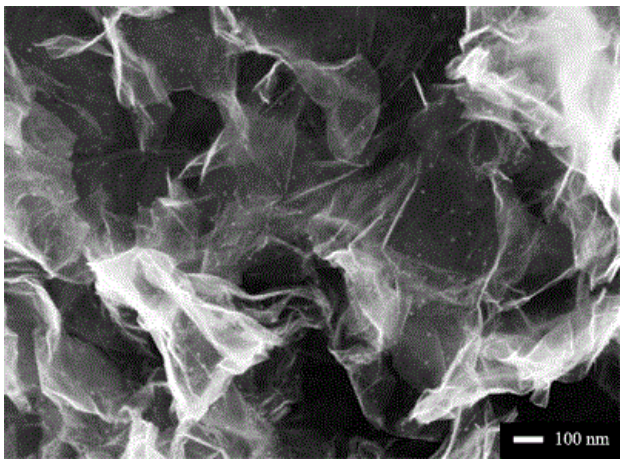
e) RGO-Pd Powder: 0.2 grams

Reduced Graphene Oxide (RGO) Powder Decorated with Palladium (Pd) Nanoparticles

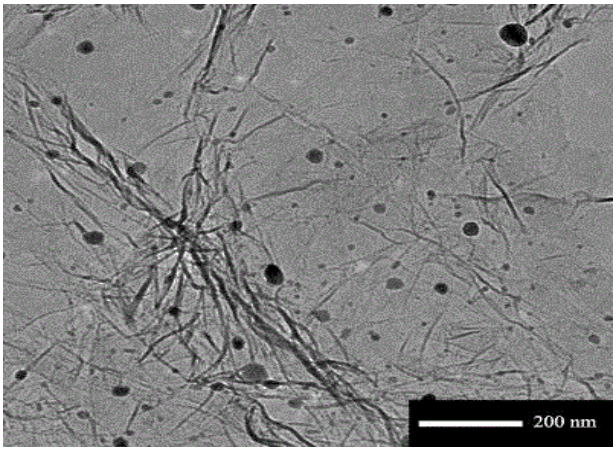
Properties

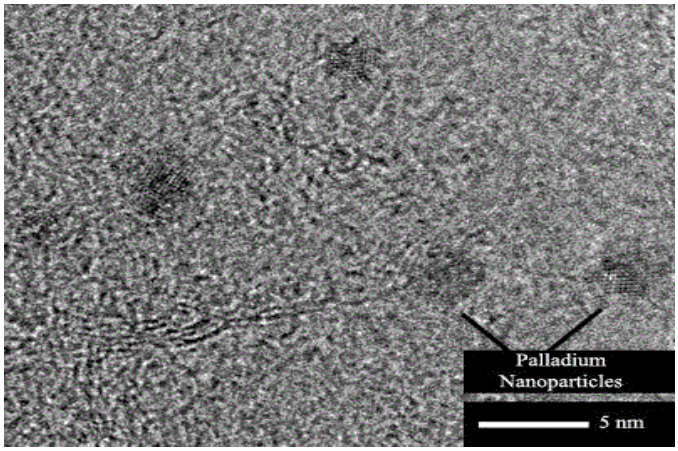
- 3-4% Palladium content
- Particle size: 2-50 nm (broad distribution)
- Form: Powder

SEM Image of RGO with Pd nanoparticles



TEM Images of RGO with Pd nanoparticles





Applications

- Perfect for Transmission Electron Microscopy imaging standard
- A catalytic material to be used in fuel cells, chemical processing, etc
- Graphene-metal hybrid materials

f) Trial pack 10 CVD Graphene TEM Grids

Trial pack: 10 CVD Graphene TEM grids includes:

5 CVD Graphene film deposited on lacey carbon TEM grids (300 Mesh) and 5 CVD Graphene film deposited on Copper TEM grids (2000 Mesh).

Availability: In Stock

We use CVD graphene grown on Ni to prepare TEM grids

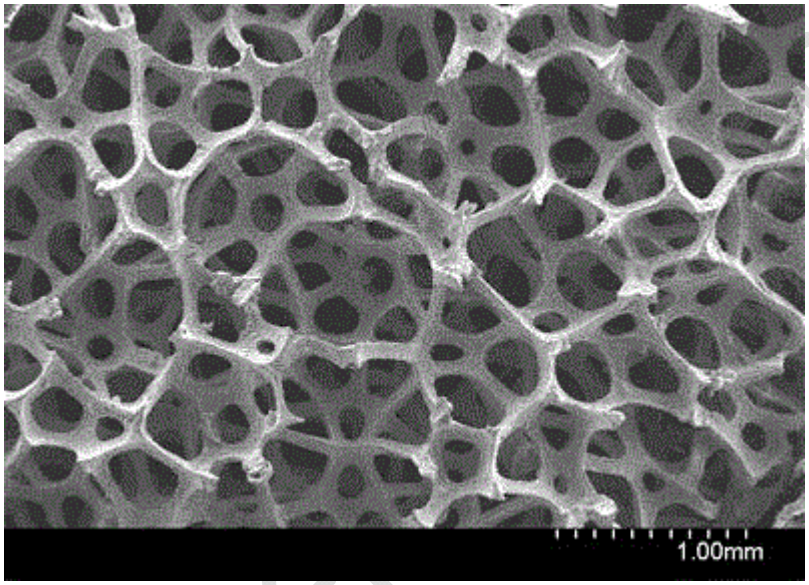
Thickness of CVD Graphene film: 0.3-2 nm (1-6 monolayers)
Typical graphene coverage:60-90%

Ultrathin CVD Graphene grids provide the ideal specimen support to achieve high resolution data in TEM imaging making them an ideal choice many TEM applications such as:
CVD Graphene grids can be used for the applications:

- Imaging of nanoparticles, proteins, viruses, DNA
- Medical Diagnostics
- Single Cell Studies
- 3D protein imaging
- Drug design
- Imaging of Biological Markers and bio-inspired nanomaterials
- Cryo-transmission electron microscopy, Electron Cryomicroscopy
- Single Particle Analysis (SPA)
- Materials science and Semiconductor Research
- Electron Energy Loss Spectroscopy (EELS)

24) 3D Graphene Foams

The 3D Graphene Foam is made via chemical vapor deposition (CVD) processing. In course of CVD fabrication of graphene hydrogen and methane gases are introduced into a furnace that heats to 1000° Celsius. In the furnace is a nickel or copper film which captures a mono or multi-layer or graphene as the furnace is heated and the methane decomposes. To create CVD Graphene Foam, instead of using a thin sheet of nickel to capture graphene, nickel or copper foam is used. The metal foam captures graphene in a similar foam structure. The metal skeleton is then etched away and left is a visible, porous 3D graphene foam structure. This structure has a high surface area, which opens several exciting applications for Graphene Foam while maintaining most of two-dimensional graphene's properties1. CVD processing of Graphene Foam opens a cost-effective route for engineering a new class of ultra-light, highly conductive graphene-based materials with exceptional mechanical strength, flexibility, and elasticity.

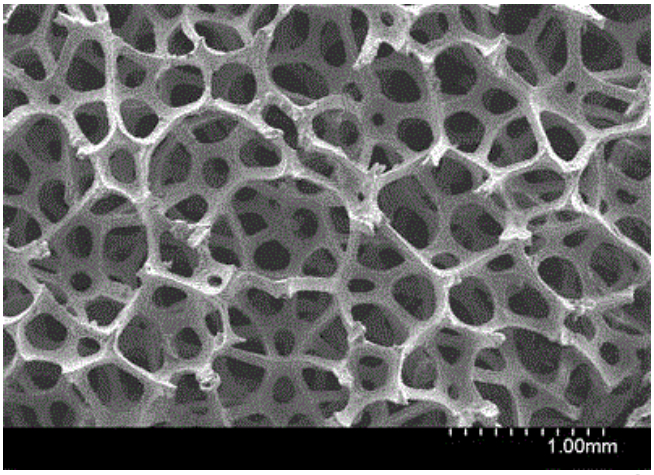


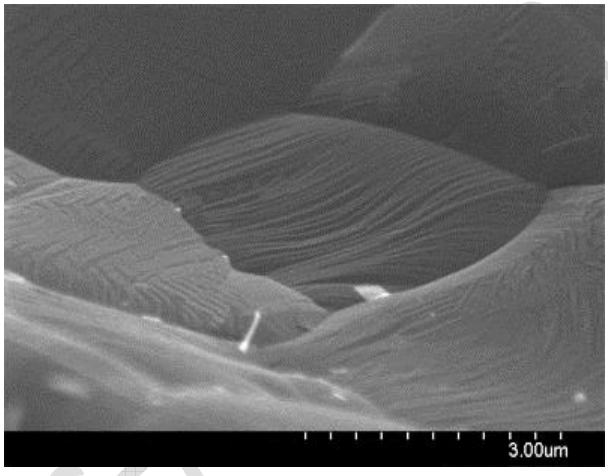
One of the likely applications of Graphene Foam is in chemical sensing. Graphene sensors which have been made with Graphene Foam were found to be about ten-times more sensitive than ones currently on the market, detecting 20 parts-per-million of nitrogen dioxide. Further, the graphene sensors were able to detect gases at room temperature, while many commercial sensors today require high temperatures to work properly. The porous graphene is not only more effective than current commercial sensors it also can easily be reused. In order to "empty" the graphene of trapped gas molecules, all the graphene needs is an electric shock. Graphene Foam graphene may also be used in energy storage, such as supercapacitors and batteries. The structure of the graphene foam opens the potential to store massive amounts of energy for example, hydrogen. The Graphene Foam has a high surface area thanks to its porous nature, giving it a high electrochemical capacitance.
The electrical and structural properties of CVD grown Graphene Foam are superior when compared to the properties of its rivals, chemically derived reduced graphene oxide and few-layered graphene nanoplatelets. Both rivals suffer from a high concentration of defects as well as poor interflake mechanical contact. This is because, unlike CVD Graphene Foam, they require many separate sheets of graphene to connect with one another whereas CVD processing creates the entire Graphene Foam at the same time.

a) 3D Monolayer Graphene Film on Copper Foam, 1.5"x1.5", TWO Pack

3D graphene on Cu Foam

- Sample size: 1.5"x1.5", two samples included
- Thickness: 1.2 mm
- Density: 320 mg/cm2
- Pore Size: 580 microns

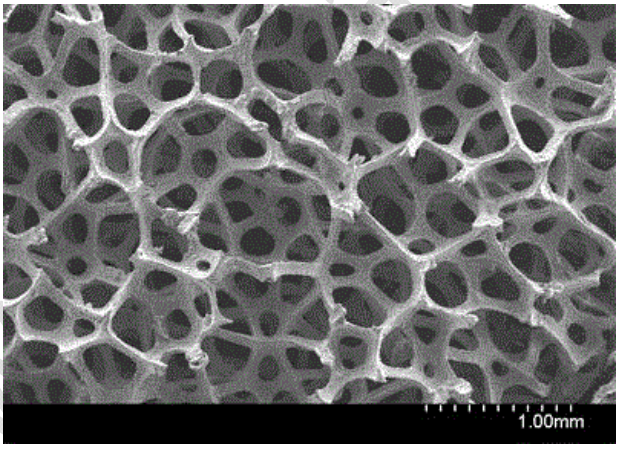


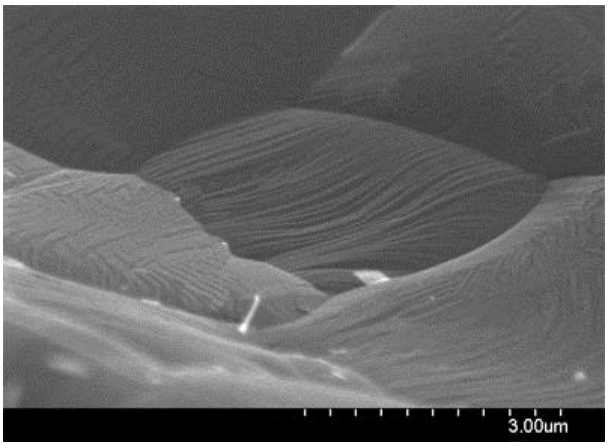


b) 3D Monolayer Graphene Film on Copper Foam, 2"x4"

3D graphene on Cu Foam

- Samples size: 2"x4"
- Thickness: 1.2 mm
- Density: 320 mg/cm2
- Pore Size: 580 microns



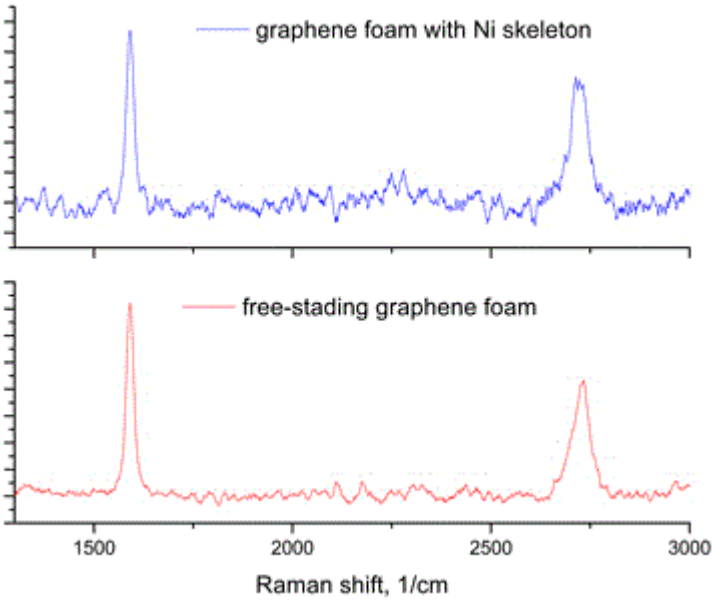


c) 3D Multilayer Freestanding Graphene Foam, 2"x2"

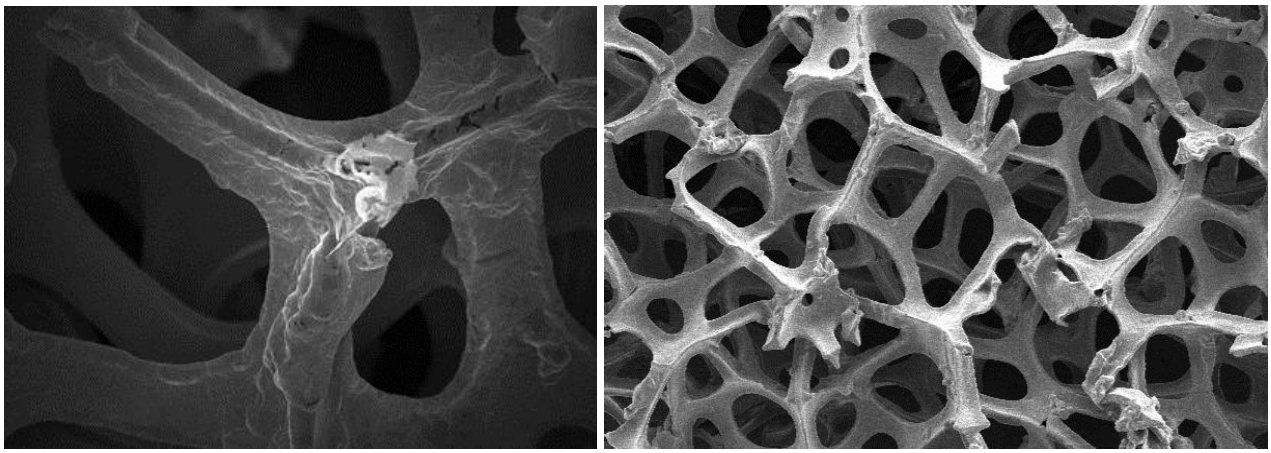
Specifications

- Sample size: 2"x2"
- Thickness: 1.2 mm
- Carbon content: 99%, no metal support
- Density: 4 mg/cm3
- Pore Size: 580 microns

Raman Spectrum of 3D Freestanding Graphene Foam:



SEM Images of 3D Freestanding Graphene Foam:

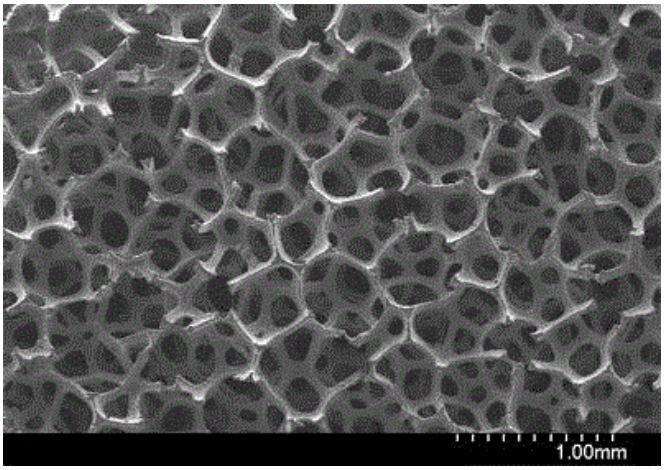


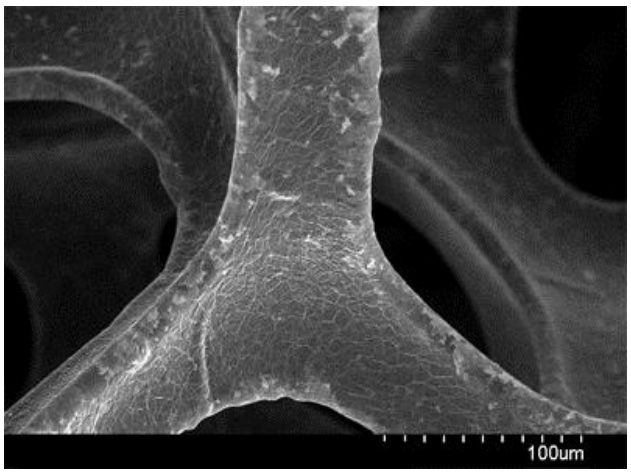
d) 3D Multilayer Graphene Film on Nickel Foam, 2"x2"

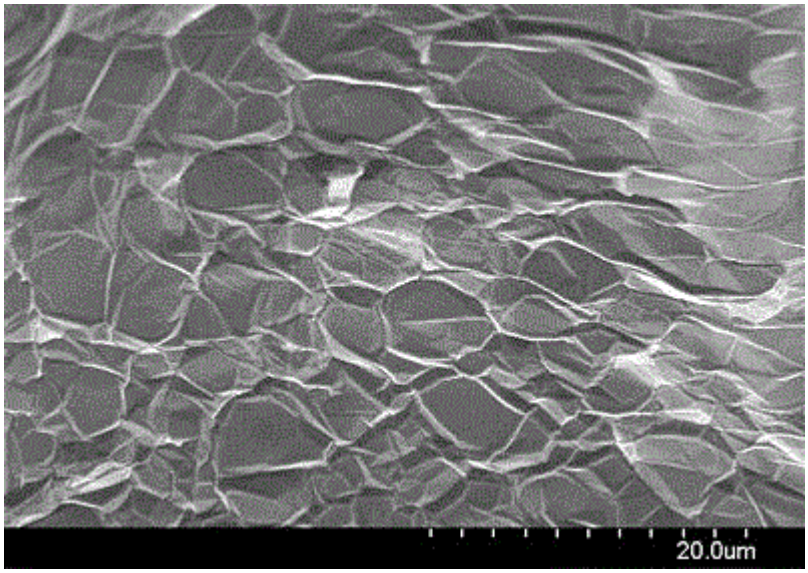
3D Multilayer graphene on Ni Foam

- Sample size: 2"x2"
- Thickness: 1.2 mm
- Density: 320 mg/cm2
- Pore Size: 580 microns

SEM Images of Graphene Film Grown on Nickel Foam:





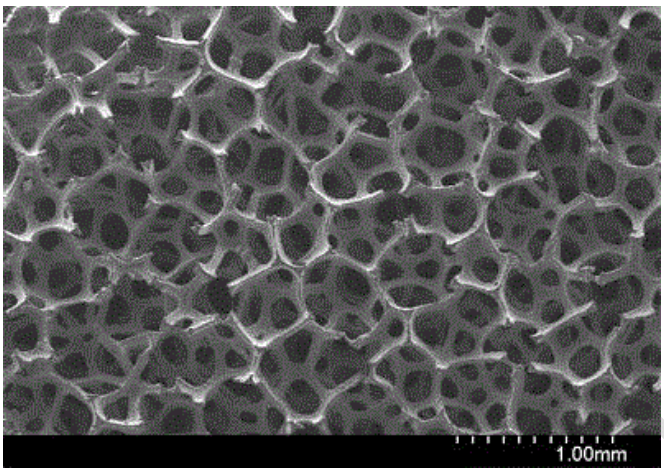


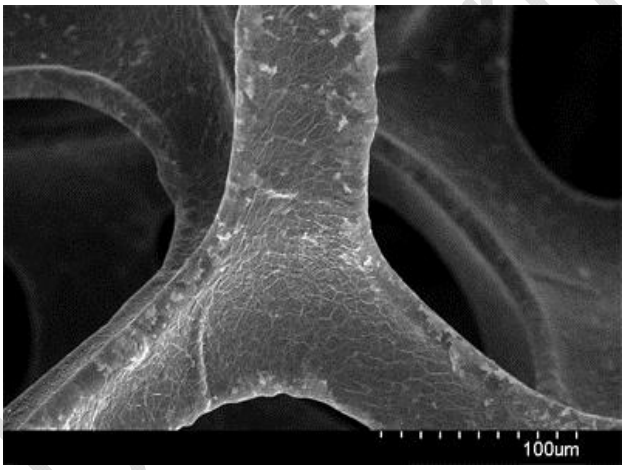
e) 3D Multilayer Graphene Film on Nickel Foam, 2"x4"

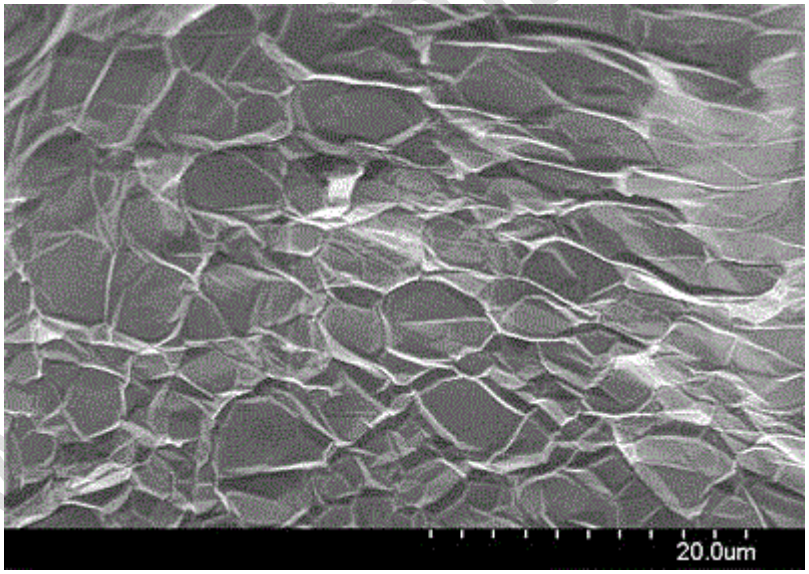
3D graphene on Ni Foam

- Sample size: 2"x4"
- Thickness: 1.2 mm
- Density: 320 mg/cm2
- Pore Size: 580 microns

SEM Images of Graphene Film Grown on Nickel Foam:







Graphene Nanoplatelets

1) Graphene Nanoplatelets (> 99.5wt%, Diameter 5-10 um, < 30 layers)
Stock #: NAM-8056YJ-GN/30

Specifications:

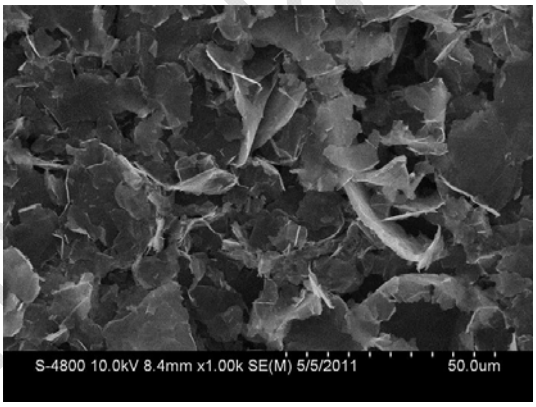
- Purity: > 99.5 wt%
- Diameter: 5-10 µm
- Number of layer: < 30
- Thickness: 4-20 nm
- pH: 7.00-7.65 at 30 oC

2) Graphene Nanoplatelets (> 90wt%, Diameter 5-10 um, < 50 layers)
Stock #: NAM-8055YJ-GN/50

Specifications:

- Graphene Nanoplatelets
- Purity: > 90 wt%
- Diameter: 5-10 µm
- Number of layer: < 50

3) Graphene Nanoplatelets (2-10nm)



Graphene nanoplatelets consist of stacks of multi-layer graphene sheets in a platelet morphology, with a high aspect ratio (width–to-thickness). True density: 2.3g/cm3

Bulk Characteristics				
Appearance	Carbon Content	Bulk Density	Water Content	Residual Impurities
Black and Grey Powder	>99.5%	~0.10 g/ml	<0.5 wt%	<0.5 wt%
Physical Properties				
Diameter	Thickness	Specific Surface Area	Electrical Conductivity	Tensile Strength
~5 µm	2-10 nm	20-40 m^2/g	80000 S/m	5 Gpa
Structure Features: The layered structure is as same as graphite crystal				

Applications

■ Use as a high performance additive for composites with PPO, POM ,PPS, PC, ABS, PP, PE, PS, Nylon and rubbers.
■ Can improve composites tensile strength, stiffness, corrosion resistance, abrasion resistance and anti-static electricity and lubricant properties.
■ For all mechanical properties modifications, typical amounts are about 2-6wt%
■ For conductivity modification, typical amounts are about 2-8wt%

Application Instruction
■ Mix Graphene nanoplatelets with the target polymer using a double-roller, banburymixer, twin screw extruder or other mixer commonly used in the plastics industry. For better dispersion of the product powder in the target polymer matrix, some surface modifiers, such as silane coupling agent, titanate coupling agent or aluminate coupling agent, etc are recommended to use before mixing the powder with plastics resin.

4) Graphene Platelet: Thickness 6-8 nm

Product Number : Gp-008(MKN)/6-8NM
CAS Number : 7782-42-5
Formula : C

Product Details

Graphene Platelet Nanopowder

- Thickness: 6-8 nm, APS: 15 micron
- Surface Area: 150 m2/g
- Carbon: 99.5+%
- Appearance: Black granules
- Bulk Density: 0.03 to 0.1 g/cc
- Oxygen Content: < 1 percent
- Residual Acid Content: < 0.5 wt%

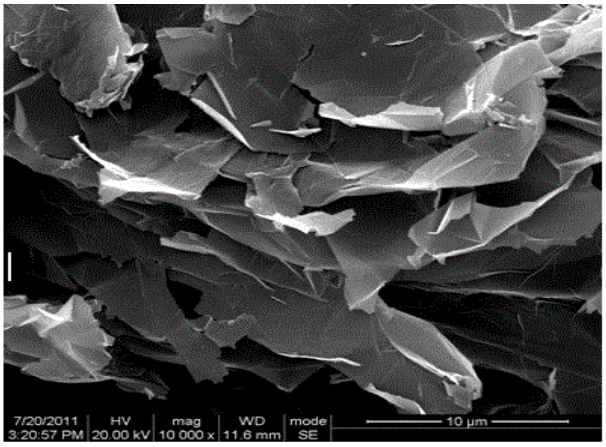
5) Graphene Platelet: Thickness 11-15 nm

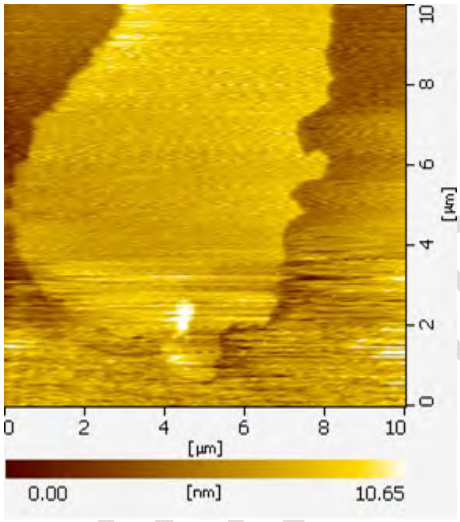
Product Number : Gp-015(MKN)/11-15NM
CAS Number : 7782-42-5
Formula : C

Product Details

- Graphene Platelet Nanopowder
- Thickness: 11-15 nm, APS: 15 micron
- Surface Area: 50-80 m2/g
- Carbon: 99.5+%
- Appearance: Black granules
- Bulk Density: 0.03 to 0.1 g/cc
- Oxygen Content: < 1 percent
- Residual Acid Content: < 0.5 wt%

6) a) Graphite Nanoplatelets (Graphene Nanoplatelets)
Product Code : TN-COC-(NSR)TNGNP



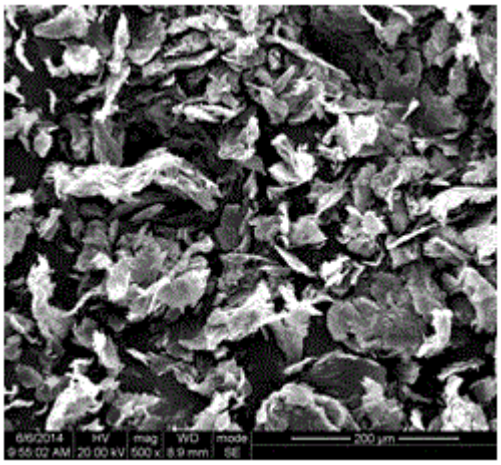


Product Description:

- Graphite Nanoplatelet (Graphene Nanoplatelet)
- Purity：>99.5wt%
- Thickness：4-20nm
- layers：<30
- Diameter：5-10 μ m
- Dengsity: 0.23g/cm3
- Volume Resistivity：4*10-4 ohm.cm
- PH Value：PH=7.00-7.65（30℃）
- Selling State: Powder

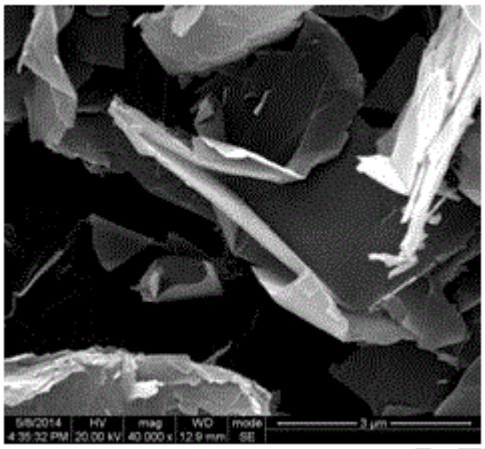
The graphite/graphene nanoplatelet keeps the original crystal structure and properties of Natural Flake Graphite and has huge ratio of diameter to thickness. It can easily form uniform composite with materials like polymer, and realize a good interface.
The graphite/graphene nanoplatelet also has excellent electrical conductivity, lubricity, corrosion resistance, thermostability and so on.

b) Graphite Nanoplatelets (Industrial Graphene Nanoplatelets)
Product Code : TN-COC-(NSR)TNIGNP



Purity：>90wt%
layers：<50
Median size d(0.5)：5-10um

c) Graphite Nanoplatelets (Industrial Graphene Nanoplatelets Paste) (TNIWGNP)
Product Code : TN-COC-(NSR)TNIWGNP



Purity：>90wt%
Solid content：About 10wt%
layers：<50
PH Value：PH=7.00-7.65（30℃）
Median size d(0.5)：5-10um

Graphene Oxide

1) a) Graphene Oxide Powder

Product Code : TN-COC-(NSR)TNGO

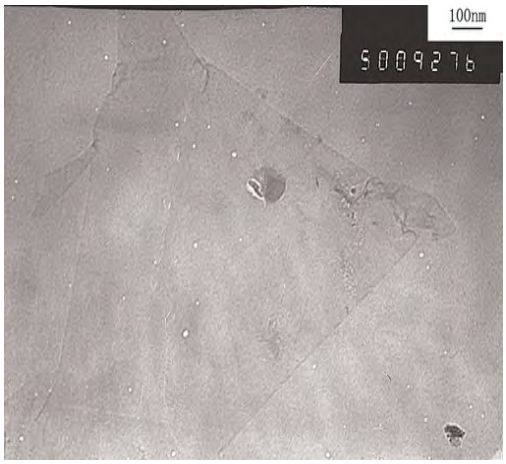
Product Description:

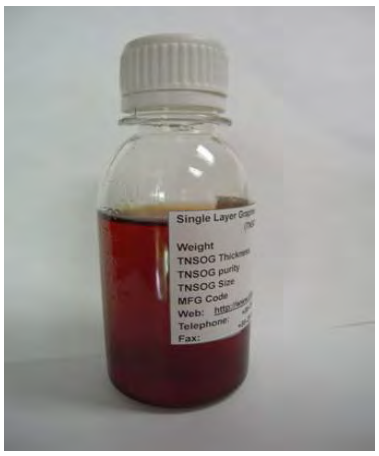
Graphene oxide powder is formed from graphene oxide gel through the vacuum freezing & drying technology. Graphene oxide in freeze drying process will not lose surface oxygen group and the layers will not overlap. The dried powder is porous, like the sponge. Graphene oxide powder is dispersed quickly and completely in the water, and almost instantly restores its original gel character.

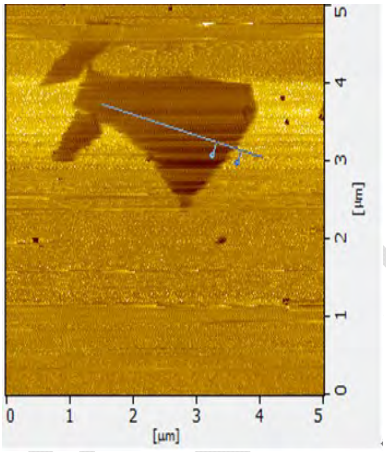
- Purity：>99wt%
- Thickness：0.55~1.2nm
- Diameter：0.5-3 μ m
- Layers：1-10
- Color ： Brown
- Selling State：Powder
- It can be well dispersed in water.

b) Graphene Oxide Gel

Product Code: TN-COC-(NSR)TNWGO







Product Description:

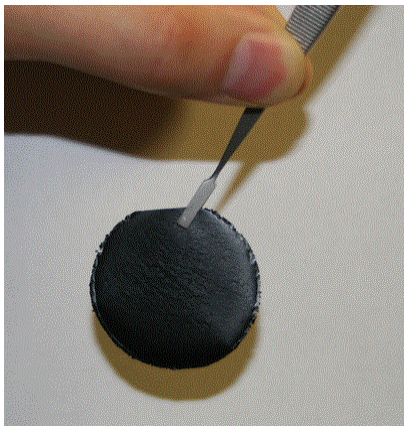
- Purity：>99wt%
- Thickness：0.55~1.2nm
- Diameter：0.5-3 μ m
- Layers：1-10
- Color ： Brown
- Selling State：Gel
- TNGO can be well dispersed in water.

2) Graphene Oxide

a) Graphene Oxide Paper

Parameters

- Diameter: 4.0cm
- Thickness: 10 microns
- Non-conductive
- Tensile modulus> 20 GPa
- Color: Black
- Bends easily



b) Nano Graphene Oxide

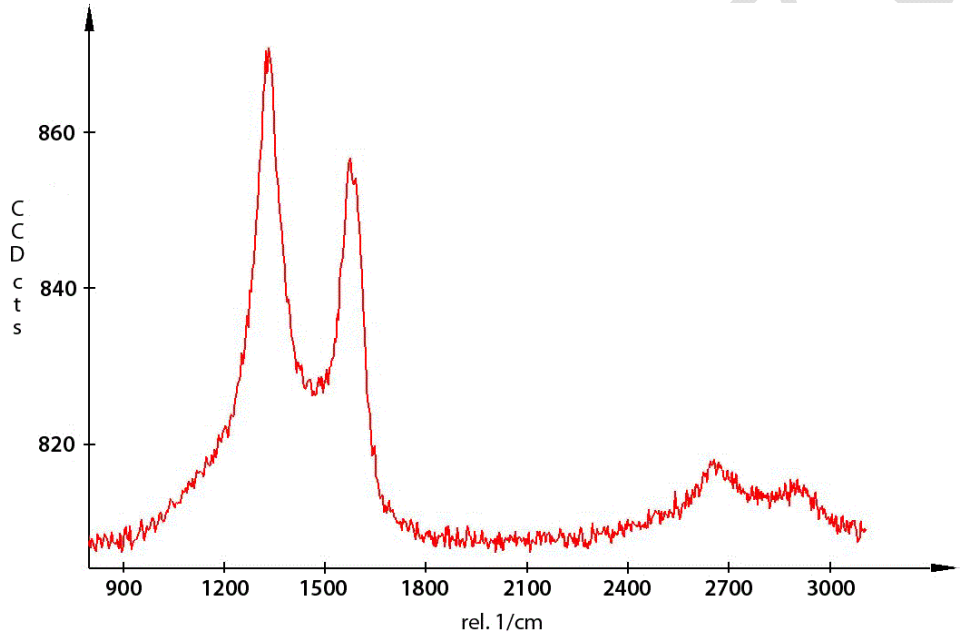
I) Nano Graphene Oxide Powder, 100 mg

100 mg of Nano Graphene Oxide Powder

Nano Graphene Oxide Powder is perfect for those who would like to utilize a graphene oxide powder with a smaller lateral flake size.

Properties:

- Diameter: 90nm, +/- 15nm
- Thickness: about 1 nm
- Single Layer Ratio: >99%
- Purity: >99%



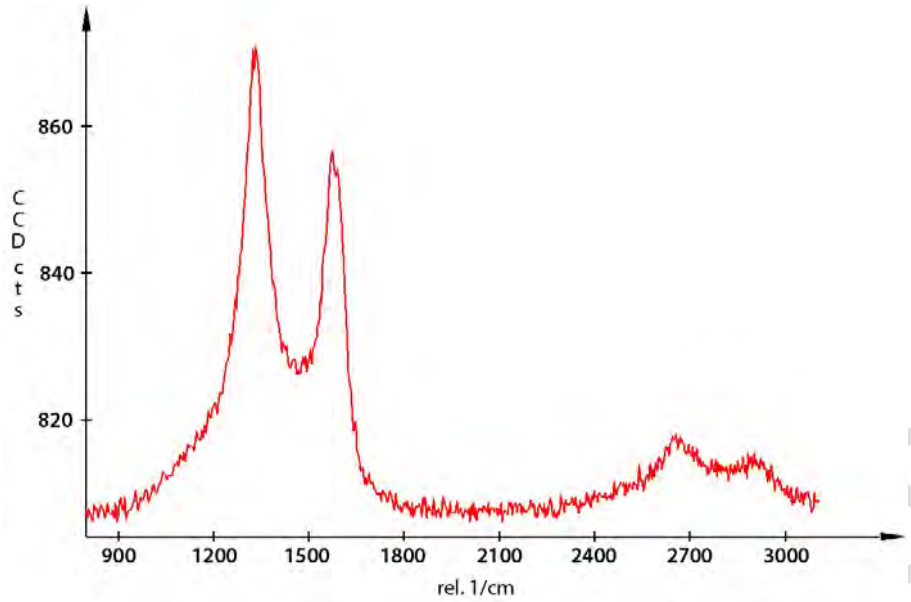
II) Nano Graphene Oxide Solution, 125 ml

125 ml solution of 1g/L Nano Graphene Oxide Aqueous Solution

Nano Graphene Oxide Solution is perfect for those who would like to utilize a graphene oxide solution with a smaller lateral flake size.

Properties:

- Diameter: 90nm, +/- 15nm
- Thickness: about 1 nm
- Single Layer Ratio: >99%
- Purity: >99%



Raman Spectrum

c) Powders/Flakes

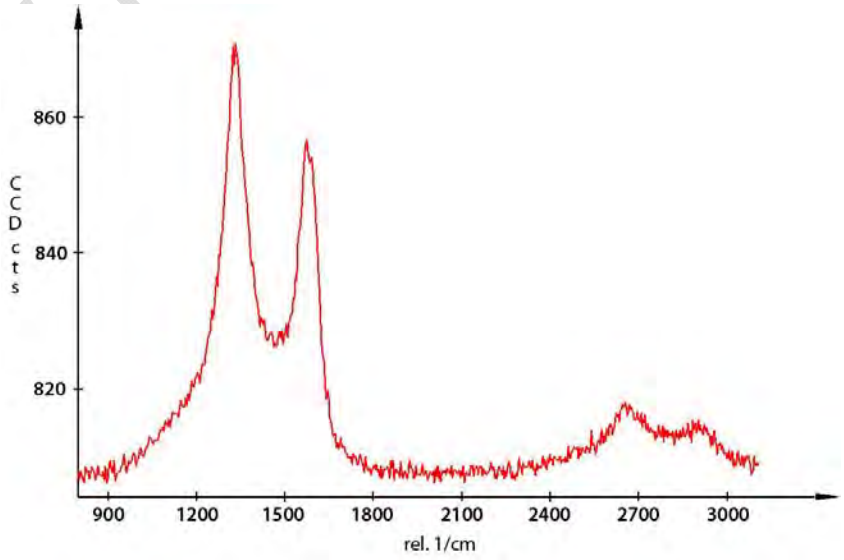
I) Nano Graphene Oxide Powder, 100 mg

100 mg of Nano Graphene Oxide Powder

Nano Graphene Oxide Powder is perfect for those who would like to utilize a graphene oxide powder with a smaller lateral flake size.

Properties:

- Diameter: 90nm, +/- 15nm
- Thickness: about 1 nm
- Single Layer Ratio: >99%
- Purity: >99%



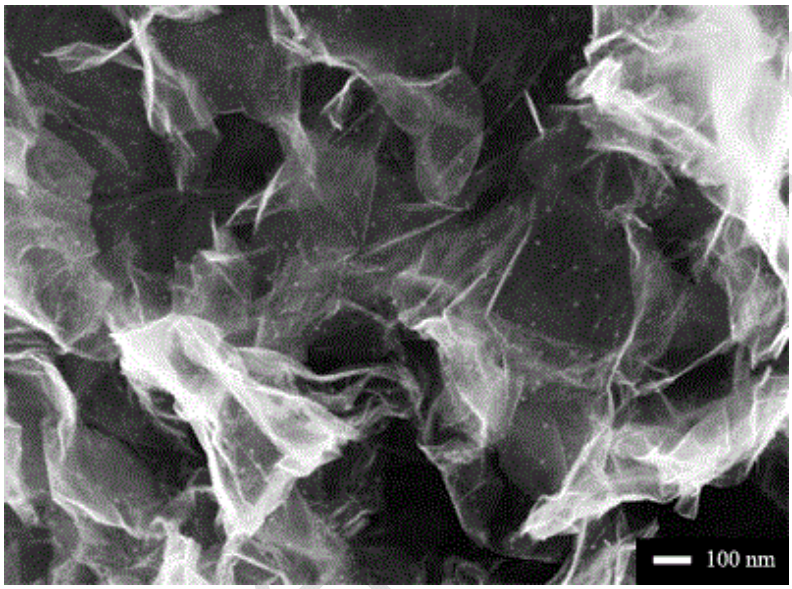
Raman Spectrum

II) RGO-Pd Powder: 0.2 grams

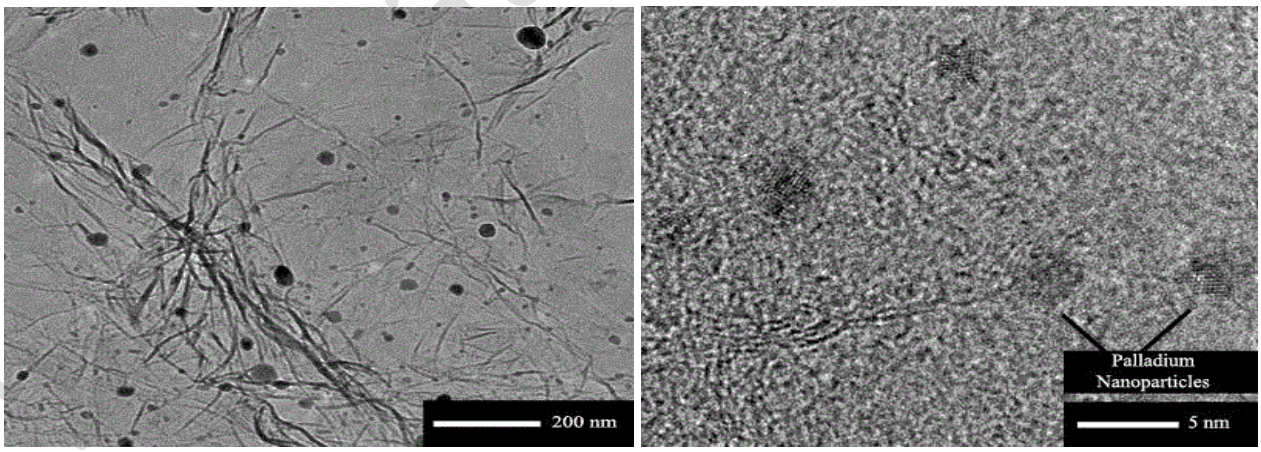
Reduced Graphene Oxide (RGO) Powder Decorated with Palladium (Pd) Nanoparticles

Properties

- 3-4% Palladium content
- Particle size: 2-50 nm (broad distribution)
- Form: Powder
- SEM Image of RGO with Pd nanoparticles



TEM Images of RGO with Pd nanoparticles

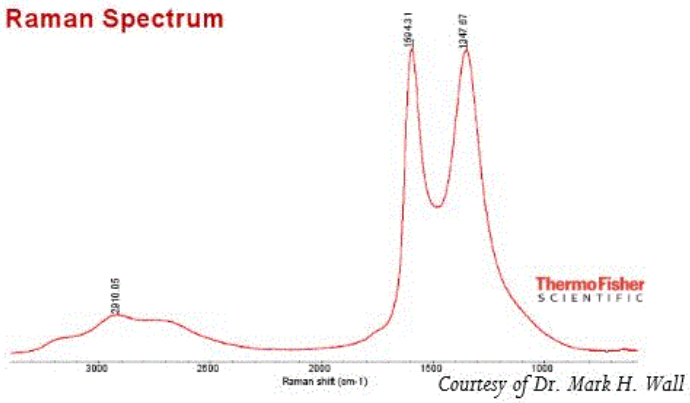


Applications

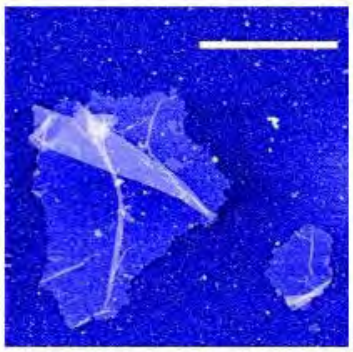
Perfect for Transmission Electron Microscopy imaging standard
A catalytic material to be used in fuel cells, chemical processing, etc
Graphene-metal hybrid materials

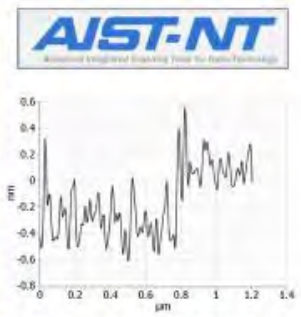
III) Single Layer Graphene Oxide: 1 Gram

Graphene Oxide: 1 Gram
Dry powder
Color: Brown
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.5-5 microns.
Thickness: 1 atomic layer - at least 80%.



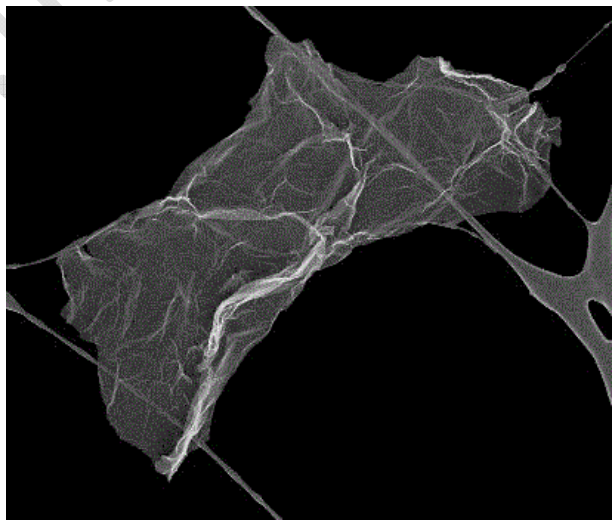
Courtesy of Dr. Mark H. Wall





AFM image and height profile of the Graphene Oxide deposited onto functionalized mica. The image was generated by SmartSPM™ (AIST-NT, Inc.).

Courtesy of Dr. Andrey Krayev



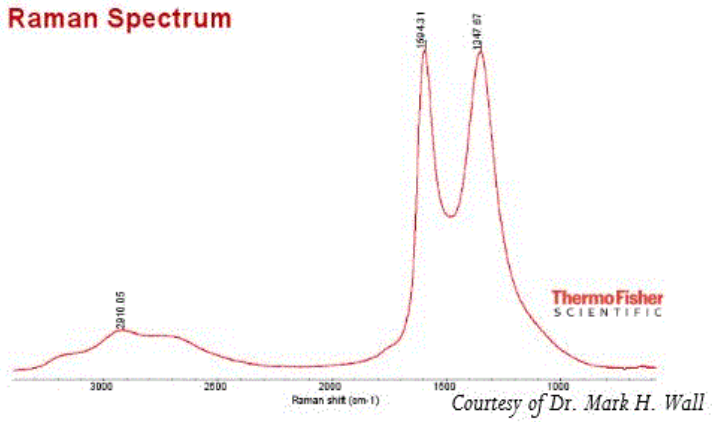
SEM image of a Graphene Oxide Flake

Applications:

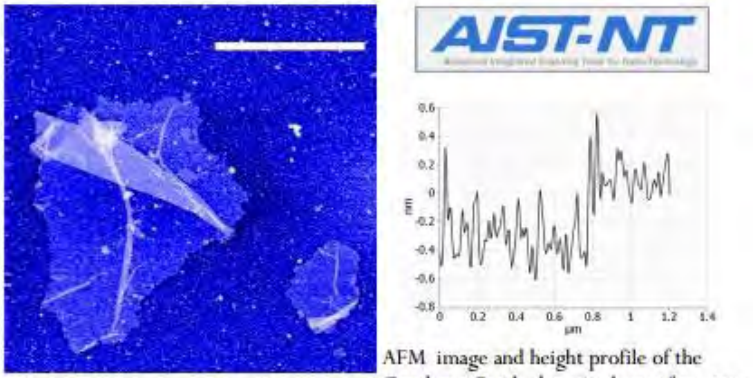
- Graphene-polymer composite materials
- Ultrastrong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Supercapacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

IV) Single Layer Graphene Oxide: 500 mg

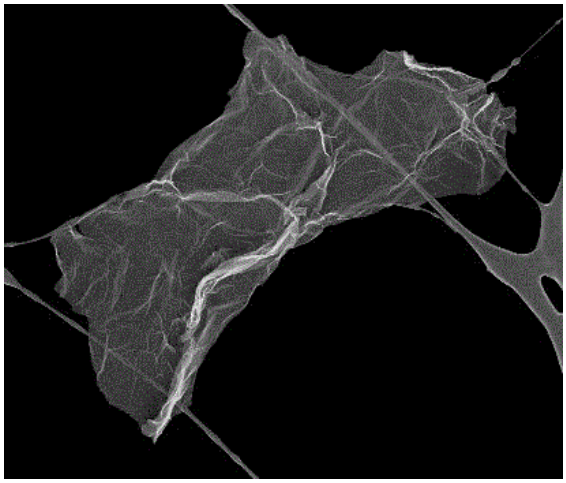
Graphene Oxide: 500 mg
Dry powder
Color: Brown
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.5-5 microns.
Thickness: 1 atomic layer - at least 80%.



Courtesy of Dr. Mark H. Wall



AFM image and height profile of the Graphene Oxide deposited onto functionalized mica. The image was generated by SmartSPM™ (AIST-NT, Inc.).
Courtesy of Dr. Andrey Krayev



SEM image of a Graphene Oxide Flake

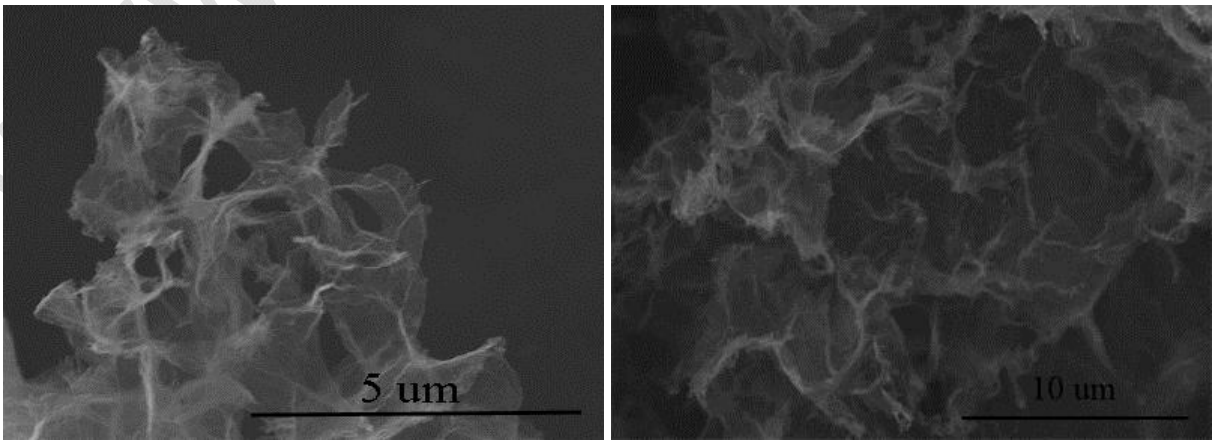
Applications:

- Graphene-polymer composite materials
- Ultrastrong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Supercapacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

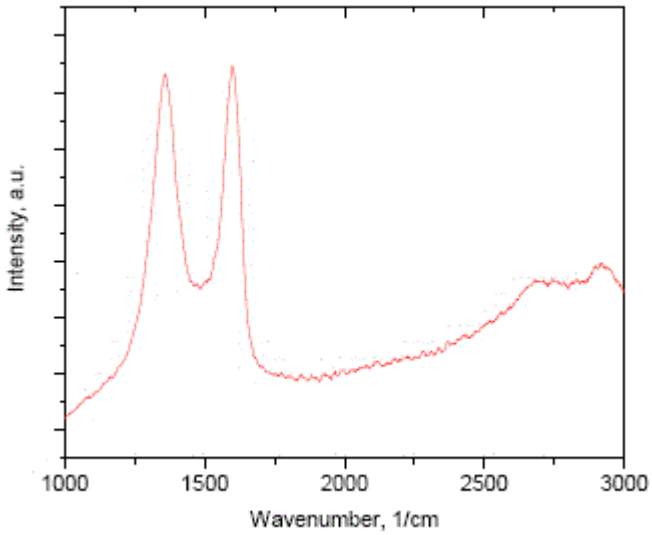
V) High Porosity Reduced Graphene Oxide-0.25G

High Porosity Reduced Graphene Oxide
250 mg (dry black powder)

Typical SEM images



Raman Spectrum



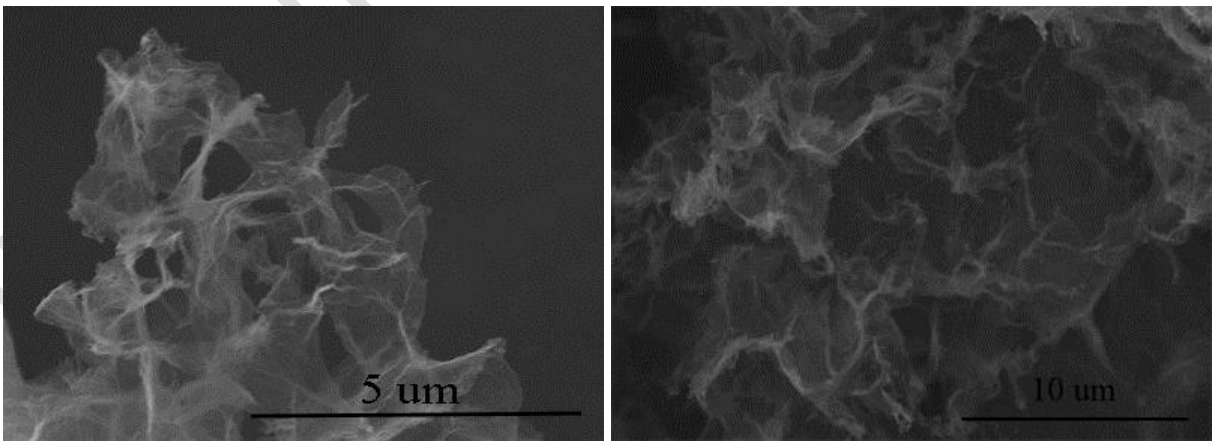
Specifications:

- Specific surface area-about 400 m2/g
- Color: Black
- Solid content: 98%
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-10 microns.
- Flakes have multiple openings and holes
- Improved solubility in organic solvents

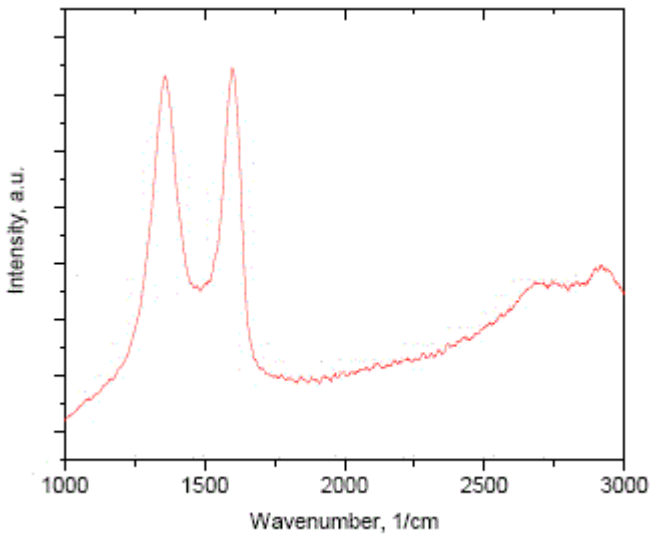
VI) High Porosity Reduced Graphene Oxide-0.5G

High Porosity Reduced Graphene Oxide
500 mg (dry black powder)

Typical SEM images



Raman Spectrum



Specifications:

- Specific surface area-about 400 m2/g
- Color: Black
- Solid content: 98%
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-10 microns.
- Flakes have multiple openings and holes
- Improved solubility in organic solvents

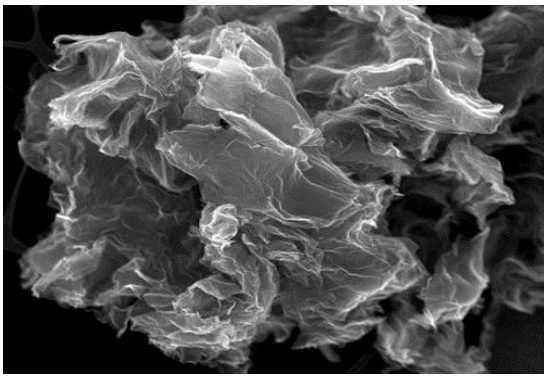
VII) High Surface Area Reduced Graphene Oxide 75 mg

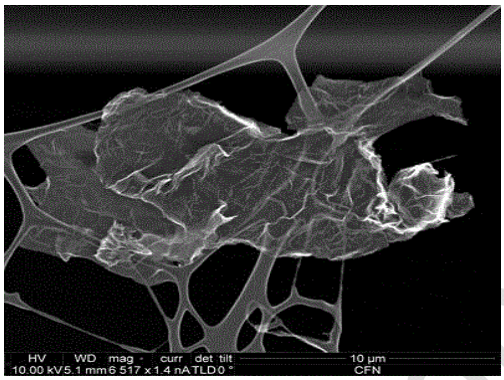
75 mg (dry black powder)

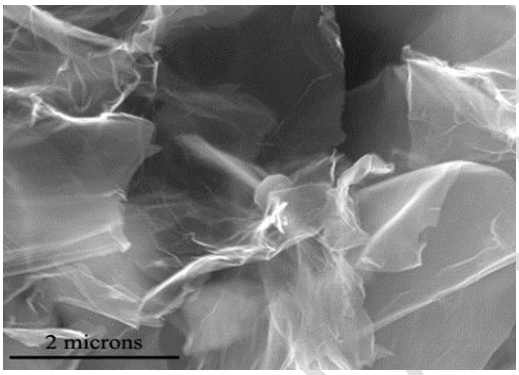
Specifications:

- Specific surface area-833 m2/g
- Color: Black
- Solid content: 98%
- Carbon/Oxygen Ratio 10.5
- Average flake thickness:1 monolayer
- Average Particle (lateral) size: ~3-5 microns.

Typical SEM images of dry nanopowder:







Applications:

- Graphene-polymer composite materials
- Electrically and thermally conductive composites
- Conductive coatings
- Aerospace industry
- Fire retardants
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

VIII) Single Layer Graphene Oxide (Small Flakes): 1g

Graphene Oxide (Small Flakes): 1 g
Dry paper-like powder
Color: Brown
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.3-0.7 microns.
Thickness: 1 atomic layer - about 50%.
Graphene oxide disperses readily in water and other solvents, breaking up into macroscopic flakes, mostly one layer thick. Graphene oxide layers are about 1.1 ± 0.2 nm thick.

Applications:

- Graphene-polymer composite materials
- Ultrastrong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Supercapacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

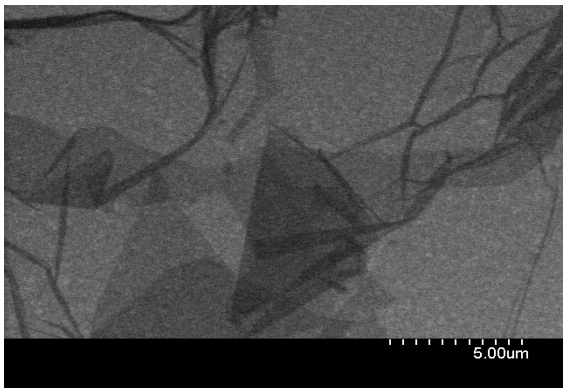
d) Solutions

I) Dispersion in Water: Single Layer Graphene Oxide (175 ml)

Aqueous dispersion, 175 ml

- Concentration: 500 mg/L
- Composition: Carbon (79%), Oxygen (20%)
- Flake size: 0.3-0.7 microns
- Thickness: 1 atomic layer - at least 80%.
- Color: Brown

Typical SEM image



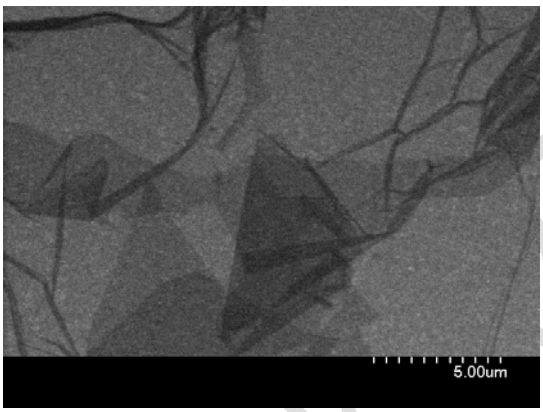
Applications:

- Graphene-polymer composite materials
- Ultrastrong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Supercapacitors
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

II) Dispersion in Water: Single Layer Graphene Oxide (60 ml)

Single Layer Graphene Oxide Dispersion in Water
Aqueous dispersion, 60 ml
Concentration: 500 mg/L
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.3-0.7 microns
Thickness: 1 atomic layer - at least 80%.
Color: Brown

Typical SEM image



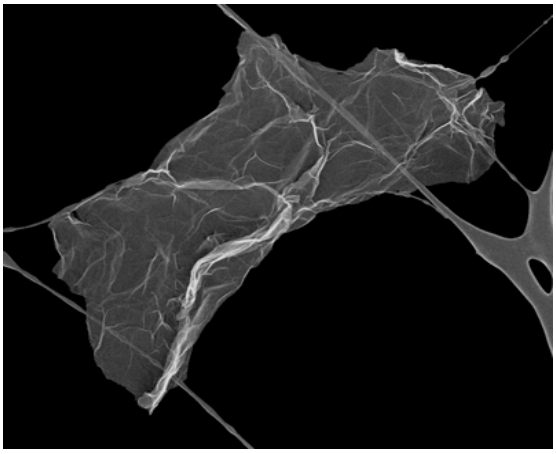
Applications:

- Graphene-polymer composite materials
- Ultrastrong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Supercapacitors
- Support for metaliic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

III) Highly Concentrated Graphene Oxide (1000 ml)

Highly Concentrated Graphene Oxide Dispersion in Water
Aqueous dispersion, 1000 ml
Concentration: 5g/L, 5 g per bottle
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.5-5 microns
Thickness: 1 atomic layer - at least 60%.
Color: Brown

Typical SEM image



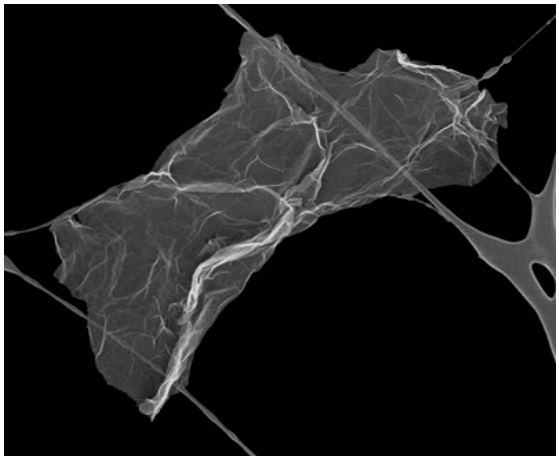
Applications:

- Graphene-polymer composite materials
- Ultra strong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Super capacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

IV) Highly Concentrated Graphene Oxide (175 ml)

Highly Concentrated Graphene Oxide Dispersion in Water
Aqueous dispersion, 175 ml
Concentration: 5g/L, 0.87g per bottle
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.5-5 microns
Thickness: 1 atomic layer - at least 60%.
Color: Brown

Typical SEM image



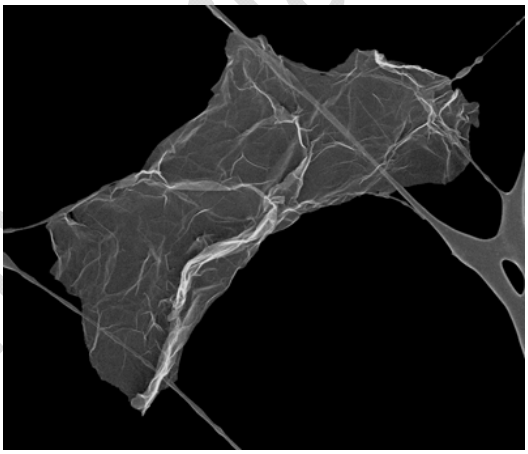
Applications:

- Graphene-polymer composite materials
- Ultra strong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Super capacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

V) Highly Concentrated Graphene Oxide (60 ml)

Highly Concentrated Graphene Oxide Dispersion in Water
Aqueous dispersion, 60 ml
Concentration: 5g/L, 0.33g per bottle
Composition: Carbon (79%), Oxygen (20%)
Flake size: 0.5-5 microns
Thickness: 1 atomic layer - at least 60%.
Color: Brown

Typical SEM image



Applications:

- Graphene-polymer composite materials
- Ultra strong graphene oxide paper
- Transparent conductive coatings
- Solar cells
- Super capacitors
- Support for metallic catalysts
- Low permeability materials
- Electro-static Dissipation (ESD) films
- Chemical and bio sensors
- Multifunctional Materials Based on Graphene
- Graphene Research

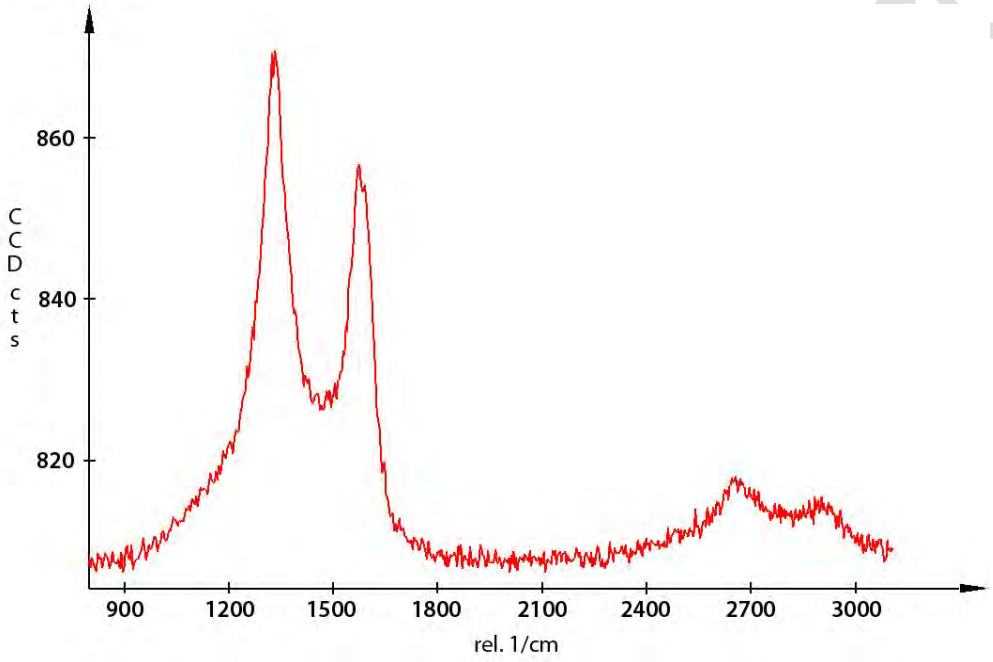
VI) Nano Graphene Oxide Solution, 125 ml

125 ml solution of 1g/L Nano Graphene Oxide Aqueous Solution

Nano Graphene Oxide Solution is perfect for those who would like to utilize a graphene oxide solution with a smaller lateral flake size.

Properties:

- Diameter: 90nm, +/- 15nm
- Thickness: about 1 nm
- Single Layer Ratio: >99%
- Purity: >99%



Raman Spectrum

VII) Ultra Highly Concentrated Single-Layer Graphene Oxide, 175 ml

Ultra Highly Concentrated formula of Single-Layer Graphene Oxide Flakes

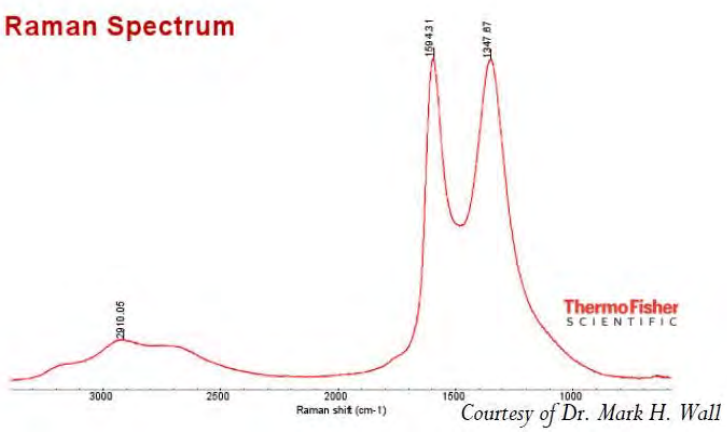
Properties:

- Concentration: 6.2 g/L
- Single Layer > 80%
- Flake Size: 0.5-5 Microns
- 1.085 grams solid content of graphene oxide per bottle
- Color: Brown
- Highly Viscous
- Aqueous Solution

Centrifugation has been used to prepare extra-large flakes and get an ultra-high concentration of Graphene Oxide. The ultra-highly concentrated graphene oxide forms paper-like substances and will coat virtually any surface, including the bottle itself.

Production of Graphene Oxide:

Graphene Oxide is the oxidized form of graphene produced by oxidizing crystal graphite with a mixture of sulfuric acid, sodium nitrate, and potassium permanganate (the Hummers method). Structurally, Graphene Oxide can be visualized as a graphene sheet with its basal plane decorated by oxygen-containing groups. Due to high affinity to water molecules by these groups, Graphene Oxide is hydrophilic and can be dissolved in water. The solubility in water makes the deposition of the thin films of the Graphene Oxide straightforward. Graphene Oxide is a poor conductor but its treatment by light, heat, or chemical reduction can restore most properties of pristine graphene.



Courtesy of Dr. Mark H. Wall

Applications:

- Transparent Conductive Films
- Composites and Paper-Like Materials
- Energy-Related Materials
- Applications in Biology and Medicine
- Anti-Bacterial Materials
- Graphene Oxide Sheets at Interfaces

VIII) Ultra Highly Concentrated Single-Layer Graphene Oxide, 500 ml

Ultra Highly Concentrated formula of Single-Layer Graphene Oxide Flakes

Properties:

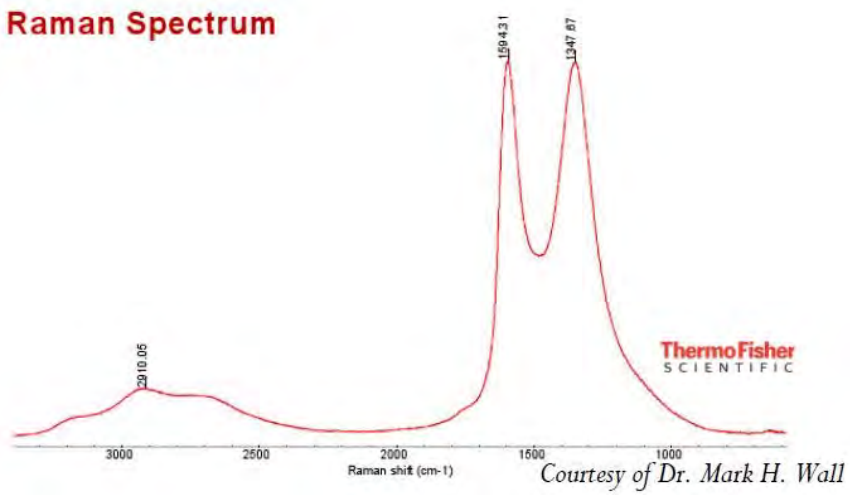
- Concentration: 6.2 g/L
- Single Layer > 80%
- Flake Size: 0.5-5 Microns
- 3.1 grams solid content of graphene oxide per bottle
- Color: Brown
- Highly Viscous
- Aqueous Solution

Centrifugation has been used to prepare extra-large flakes and get an ultra-high concentration of Graphene Oxide. The ultra-highly concentrated graphene oxide forms paper-like substances and will coat virtually any surface, including the bottle itself.

Production of Graphene Oxide:

Graphene Oxide is the oxidized form of graphene produced by oxidizing crystal graphite with a mixture of sulfuric acid, sodium nitrate, and potassium permanganate (the Hummers method). Structurally, Graphene

Oxide can be visualized as a graphene sheet with its basal plane decorated by oxygen-containing groups. Due to high affinity to water molecules by these groups, Graphene Oxide is hydrophilic and can be dissolved in water. The solubility in water makes the deposition of the thin films of the Graphene Oxide straightforward. Graphene Oxide is a poor conductor but its treatment by light, heat, or chemical reduction can restore most properties of pristine graphene.



Applications:

- Transparent Conductive Films
- Composites and Paper-Like Materials
- Energy-Related Materials
- Applications in Biology and Medicine
- Anti-Bacterial Materials
- Graphene Oxide Sheets at Interfaces

IX) Ultra Highly Concentrated Single-Layer Graphene Oxide, 60 ml

Ultra Highly Concentrated formula of Single-Layer Graphene Oxide Flakes

Properties:

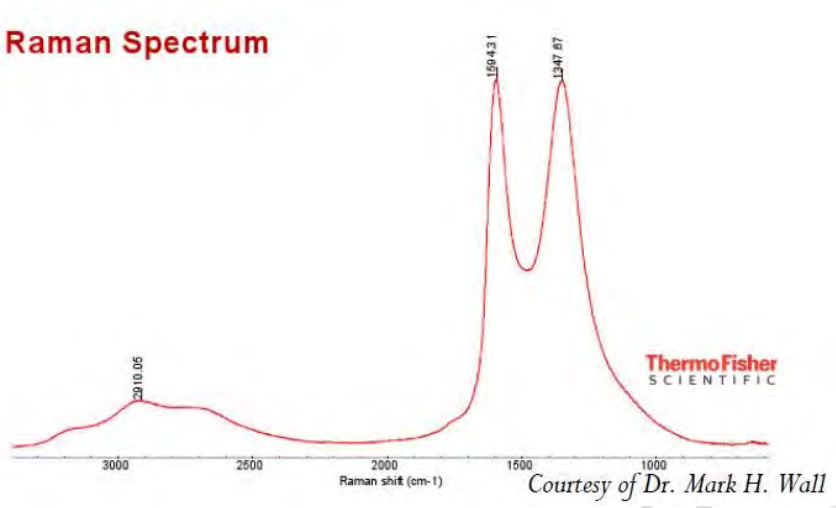
- Concentration: 6.2 g/L
- Single Layer > 80%
- Flake Size: 0.5-5 Microns
- 375 mg solid content of graphene oxide per bottle
- Color: Brown
- Highly Viscous
- Aqueous Solution

Centrifugation has been used to prepare extra-large flakes and get an ultra-high concentration of Graphene Oxide. The ultra-highly concentrated graphene oxide forms paper-like substances and will coat virtually any surface, including the bottle itself.

Production of Graphene Oxide:

Graphene Oxide is the oxidized form of graphene produced by oxidizing crystal graphite with a mixture of sulfuric acid, sodium nitrate, and potassium permanganate (the Hummers method). Structurally, Graphene Oxide can be visualized as a graphene sheet with its basal plane decorated by oxygen-containing groups. Due to high affinity to water molecules by these groups, Graphene Oxide is hydrophilic and can be dissolved in water. The solubility in water makes the deposition of the thin films of the Graphene Oxide straightforward. Graphene

Oxide is a poor conductor but its treatment by light, heat, or chemical reduction can restore most properties of pristine graphene.



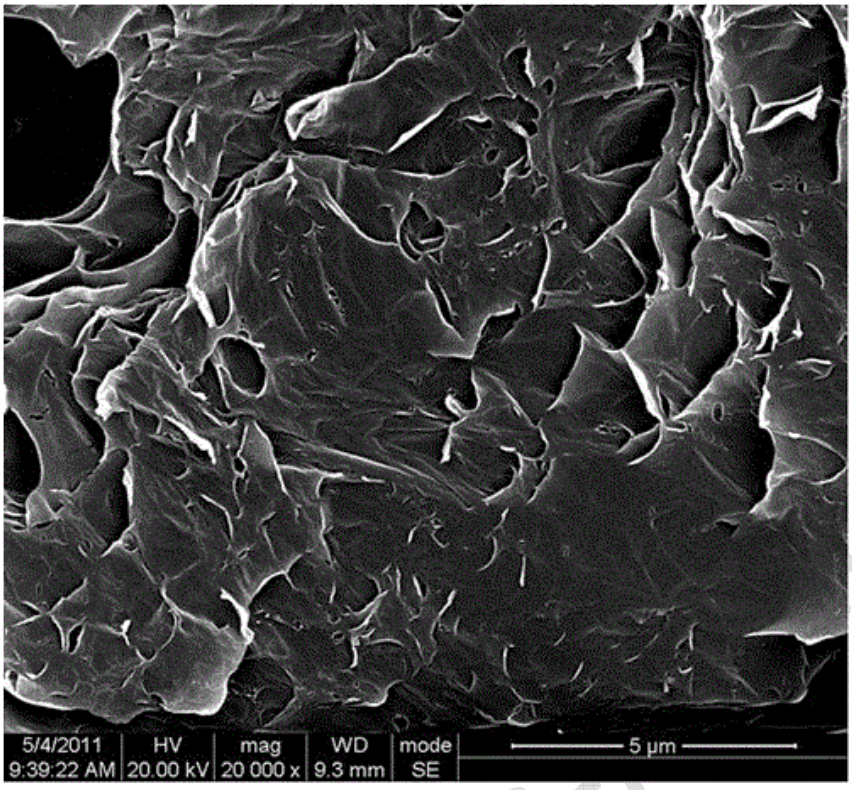
Applications:

- Transparent Conductive Films
- Composites and Paper-Like Materials
- Energy-Related Materials
- Applications in Biology and Medicine
- Anti-Bacterial Materials
- Graphene Oxide Sheets at Interfaces

3) Graphene Oxide (Diameter 0.5-3 um, Thickness 0.55~1.2 nm)

stock#: 2192YJ

- Purity: > 99 wt%
- Diameter: 0.5-3 μm
- Thickness: 0.55~1.2 nm
- Layers: 1-10
- Color: Brown
- Dispensability: graphene oxide can be well dispersed in water



4) 1 wt% Graphene Oxide (>99%, D 0.5-3 um, T 0.55-1.2 nm) Gel

Stock #: 8047J
Graphene Oxide Gel
Color: brown
Content of Graphene Oxide: ~ 1 wt%
Solubility: soluble in water
Stability: up to 6 months at room temperature

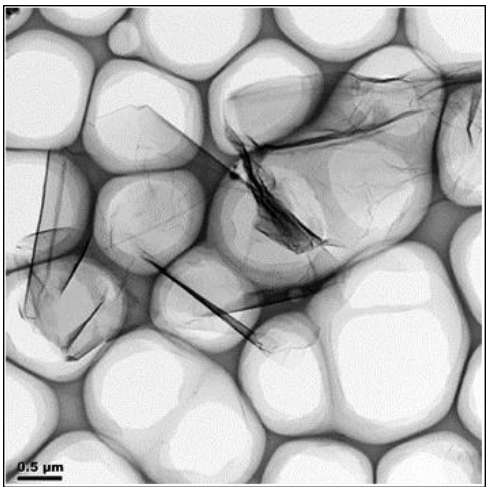
Graphene Oxide description:

- Purity: > 99 wt%
- Diameter D: 0.5-3 µm
- Thickness L: 0.55-1.2 nm
- Number of layers: 1-10

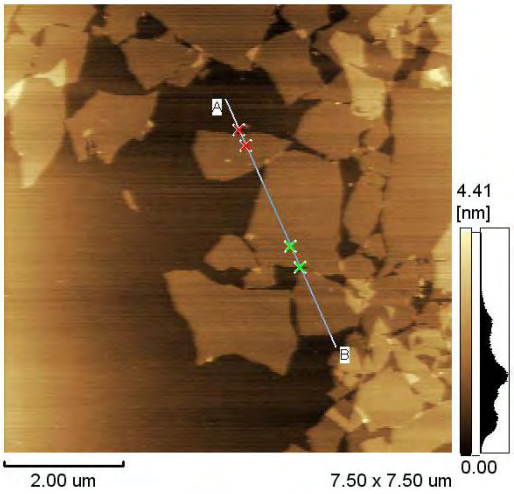
5) a) Single Layer Graphene Oxide

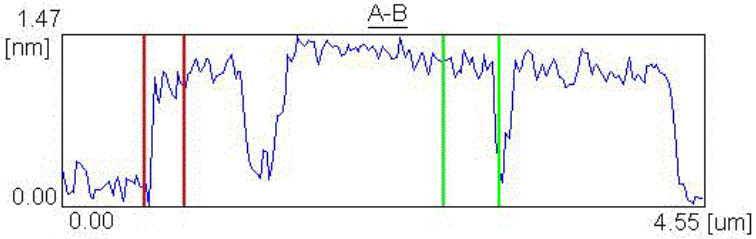
Preparation Method: Modified HUMMER's method

Graphene Oxide	
Diameter	1~5 μm
Thickness	0.8~1.2 nm
Single layer ratio	~99%
Purity	~99%



TEM of Graphene Oxide





	Width[um]	Height[nm]	Angle[deg]
—	0.28	0.86	0.17
—	0.39	0.93	0.13

b) High Surface Area Graphene Oxide

Preparation Method

Preparation Method: Modified HUMMER'S method

Composition/Information on Ingredients

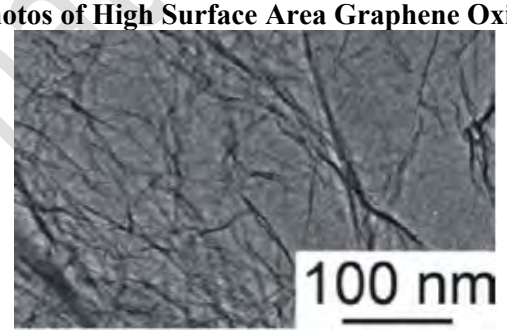
Elemental compositions of graphene oxide

Sample	N (wt %)	C (wt %)	O (wt %)	C/O at. ratio
Graphene Oxide	0	51.26	40.78	1.67

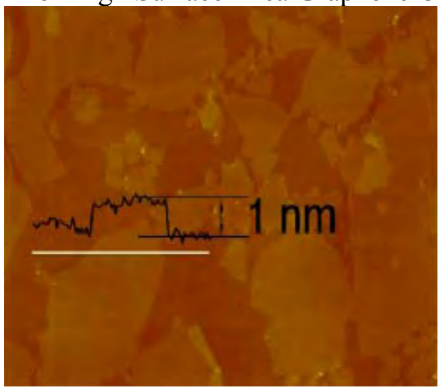
Characterization & Analysis

High Surface Area Graphene Oxide	
Diameter	1~5 μm
Thickness	0.8~1.2 nm
Single layer ratio	~99%
Purity	~99%
Specific Surface Area (BET)	>100 m^2/g

Photos of High Surface Area Graphene Oxide



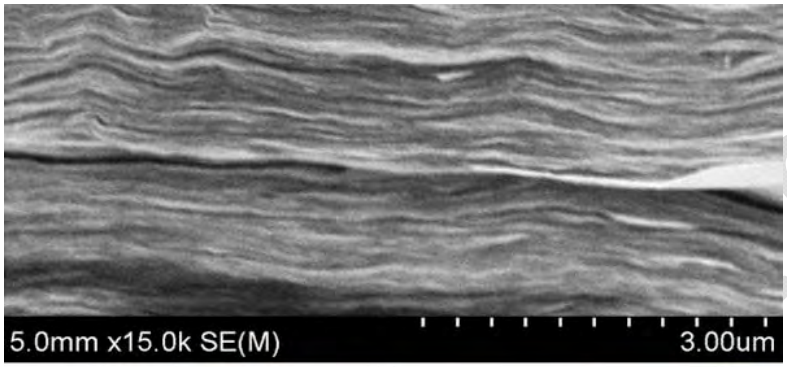
*TEM of High Surface Area Graphene Oxide

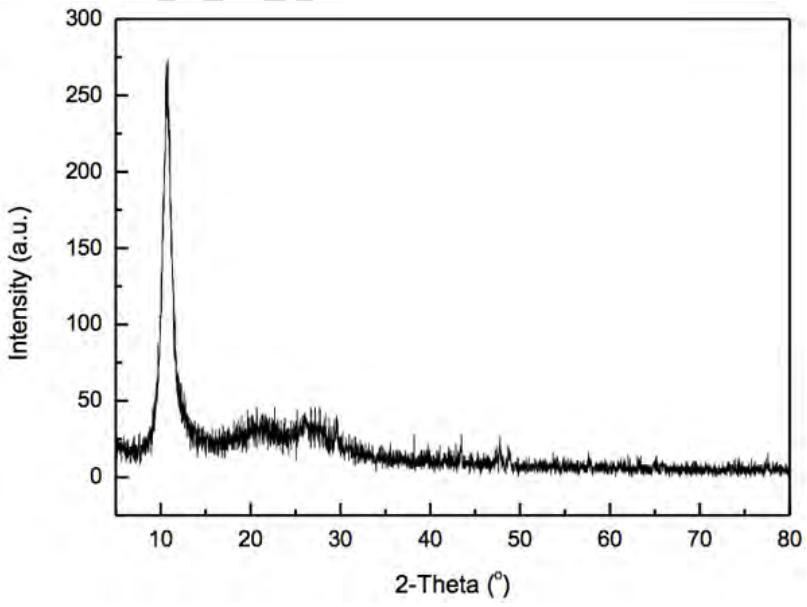


*AFM of High Surface Area Graphene Oxide

6) Graphene Oxide Film-Super Paper

Diameter	40 mm
Thickness	20 μ
Electrical Conductivity	Non-conductive, $8x10^{-2}$ S/m
Tensile Modulus	> 20 GPa
Color	Black, Brown or Yellow
Bends easily, Flexible	

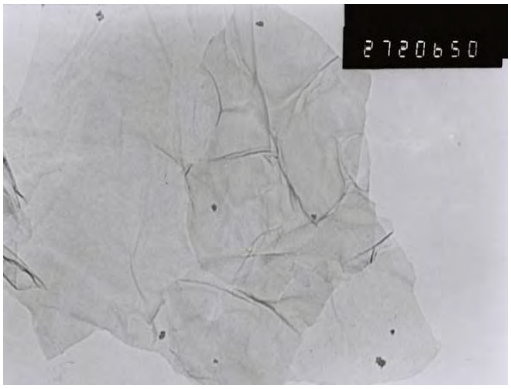


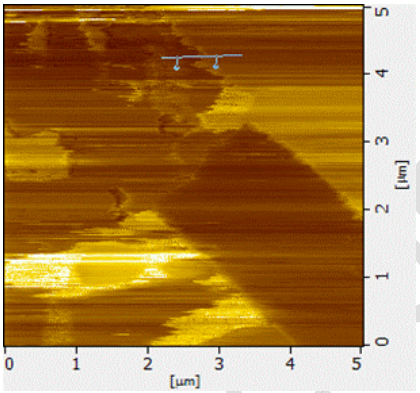


Graphene Dispersion

1) Graphene Dispersion

Product Code : TN-COC-(NSR)TNWRGO





Product Description:

- Reduced Graphene Oxide Dispersion
- Purity：>95wt%
- Thickness：0.55~3.74nm
- Diameter：0.5-3 μ m
- Layers: 1-10
- Specific Surface Area：500-1000m2/g
- Color: Black
- Selling State：water dispersion

2) Graphene Solutions

a) Conductive Graphene Dispersion (100 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

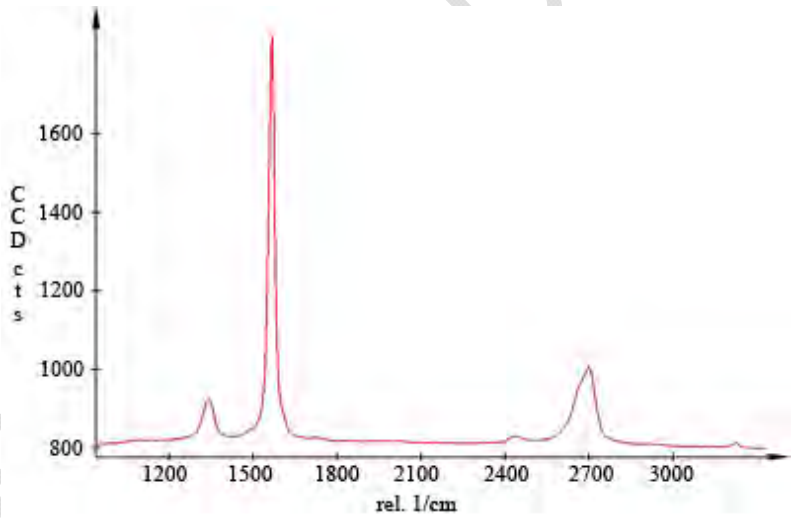
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

Properties

Graphene Nanoplatelets: Average thickness - 7 nm
23 wt% Total graphene content
Solvent: N-Butyl acetate
Proprietary dispersant (2%)
Image of paper coated with our Conductive Graphene Dispersion

Low quantity of defects as confirmed by Raman Spectroscopy

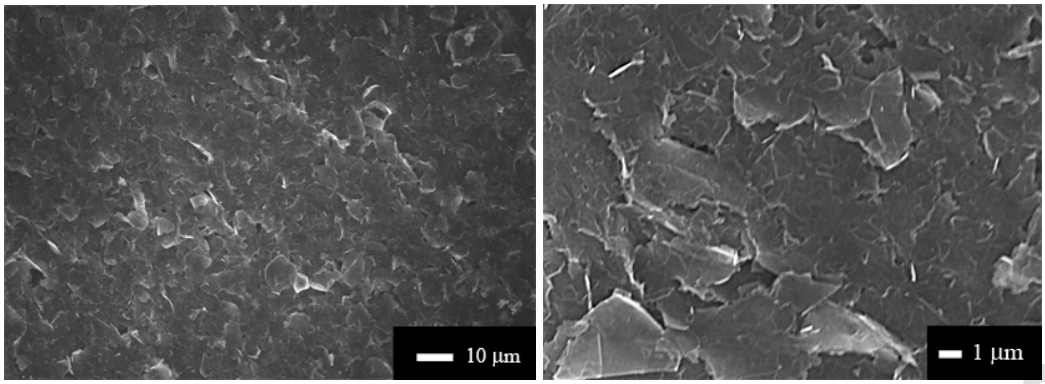


Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.

Films made from this dispersion require 30 minutes of drying time at room temperature.

Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.

SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 ° C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

b) Conductive Graphene Dispersion (200 ml)

Ultra-high Concentration Dispersion of Graphene Nanoplatelets

Silvery thick dispersion of graphene flakes in n-butyl acetate.

Keep in a tightly closed container, away from elevated temperatures.

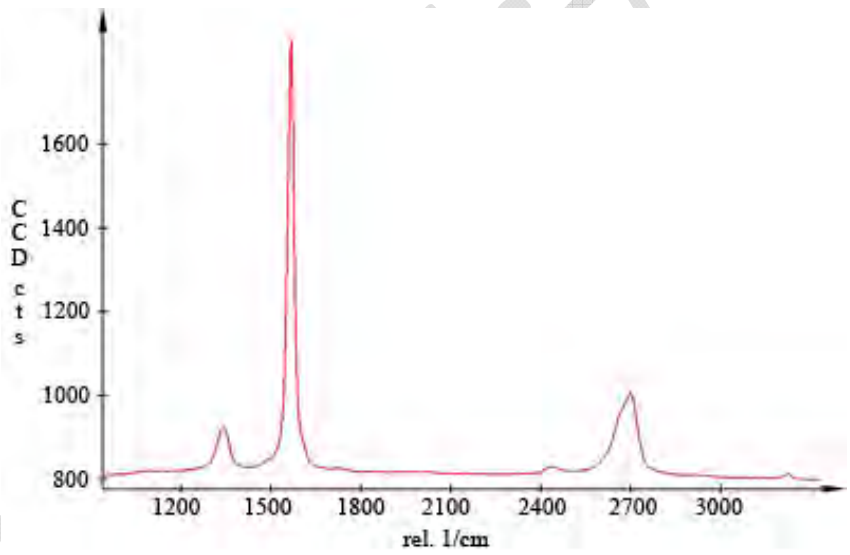
Stirring is recommended before use.

Work in well ventilated space; working under a chemical hood is preferred.

Properties

- Graphene Nanoplatelets: Average thickness - 7 nm
- 23 wt% Total graphene content
- Solvent: N-Butyl acetate
- Proprietary dispersant (2%)
- Image of paper coated with our Conductive Graphene Dispersion

Low quantity of defects as confirmed by Raman Spectroscopy

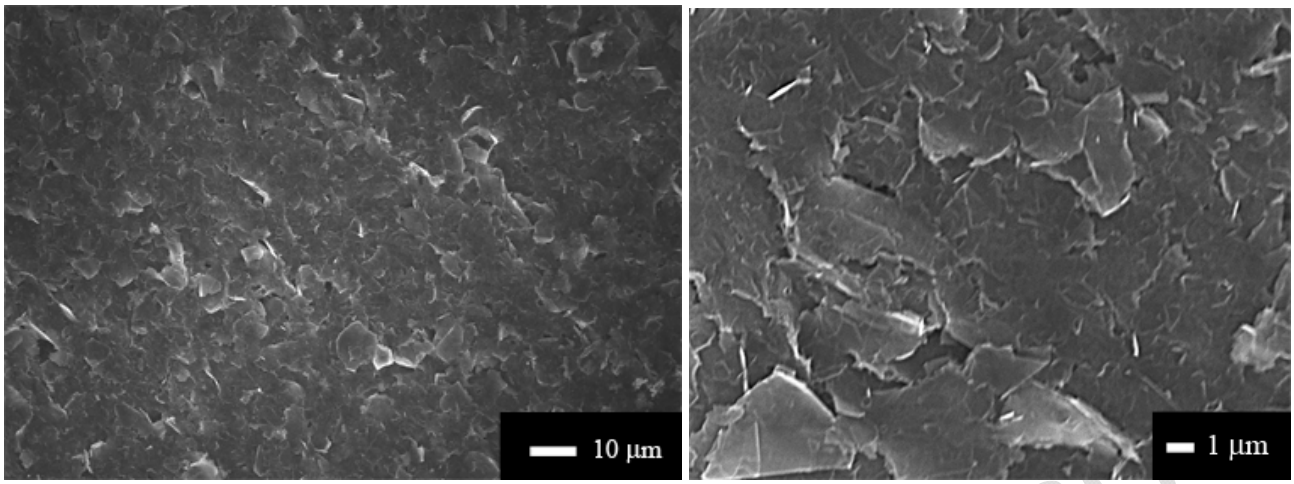


Graphene dispersions easily form micron-thick highly conductive films on most substrates including paper, glass, plastic films and cartons.

Films made from this dispersion require 30 minutes of drying time at room temperature.

Such films can be deposited by blade or bar coating. These films have a smooth, paper-like structure.

SEM images of Conductive Graphene Dispersion on paper



Though films are conductive as deposited, conductivity may be improved by gentle annealing in air at temperatures which do not exceed 350 ° C. After annealing, values will be in the range of 10-20 Ohms/□ at 25 micron film thickness. This value is given as an example, the actual value will depend upon deposition method and the target substrate.

Applications:

- An additive to polymers, graphene-based composites
- Thermally conductive compounds
- Inks and coatings
- Heat sinks
- Electromagnetic Interference Shielding
- Thin film batteries
- Antistatic films

c) Pristine Graphene Monolayer Flakes (50 ml)

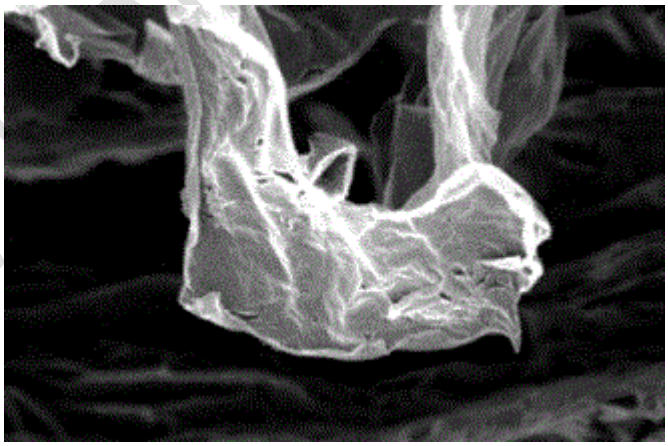
Pristine Graphene Monolayer Flakes (50 ml)

Dispersion in ethanol.
Concentration: 1 mg/L
Concentration: 1 mg/L
Carbon content: 99.99%
Ultrapure: no oxidation, no surfactants
Average flake thickness: 0.35 nm (1 monolayer)
Average Particle (lateral) size: ~ 550 nm (150-3000) nm.

3) Research Grade Graphene Water Dispersion (Thickness 0.55nm - 2.85nm, Diameter 0.55 - 5.5um, Dispersed in water with 1 wt%)

Graphene has a two-dimensional structure of a carbonaceous new material. Graphene has excellent electrical, thermal and mechanical properties. Our Company produced graphene with a very large surface area 500 ~ 1200m2/g; It is very difficult to be dispersed in a polar or non-polar solvents. Based on our lab experimental results from numerous dispersants screened out, we added one best suitable special dispersant and used a high capacity ultrasonic equipment to disperse our graphene product. After testing, the liquid is a very uniform and very stable graphene water dispersion product.

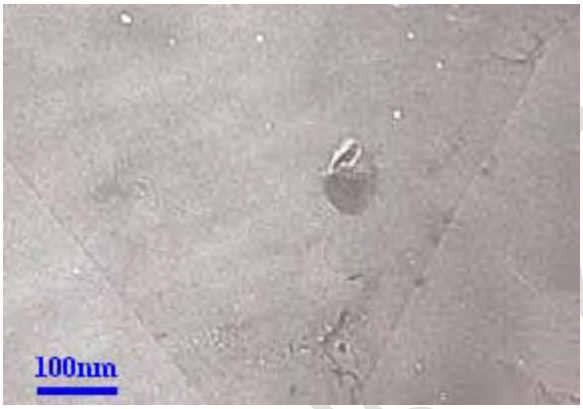
Purity: > 99.3wt%
Thickness: 0.55nm - 2.85nm
Diameter: 0.55um - 5.5μm
Specific Surface Area: 500 - 1200m2/g
Color: Black liguid
Concentration: 1wt% (To dilute it to your desired concentration, only add pure water and shake it up!)
The Product COA: C=99.6%, O<0.4%



4) Research Grade Single Layer Graphene Oxide Water Dispersion (Thickness 0.43 - 1.23 nm, Diameter 1.5 - 5.5 um, Dispersed in water with 2wt%)

Research Grade Single Layer Graphene Oxide Water Dispersion

Purity: >99.3% -- Single Layer Graphene Oxide
Diameter Ø: 1.5-5.5 um
Thickness: 0.43-1.23 nm
Color: Amber liquid
Concentration: 2wt% (To dilute it to your desired concentration, only add pure water and shake it up!)



5) 0.4-0.5 wt% Graphene (>99%, D 0.5-3 um, T 0.55-3.74 nm) in water
Stock #: 8046J

Graphene/Water Dispersions
Content of Graphene: 0.4-0.5 wt%
Content of dispersants: 0.4-0.5 wt%
Stability: up to 6 months at room temperature

Graphene description:

- Purity: > 99 wt%
- Diameter D: 0.5-3 μm
- Thickness L: 0.55-3.74 nm
- Number of layers: 1-10
- SSA: 500-1000 m2/g
- Color: black

6) 10 wt% Graphene Nanoplatelets (> 90%, D 5-10 um, < 50 layers) in water
Stock #: 8053J

Graphene Nanoplatelets/Water Pastes
Content of Graphene Nanoplatelets: ~10 wt%
Stability: up to 2 months at room temperature

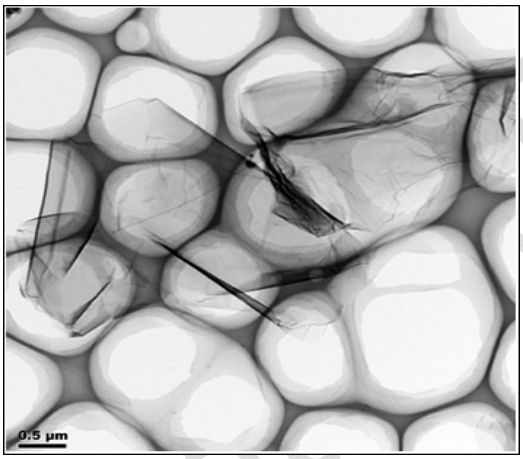
Graphene Nanoplatelets description:

- Purity: > 90 wt%
- Diameter D: 5-10 μm
- Number of Layers: < 5

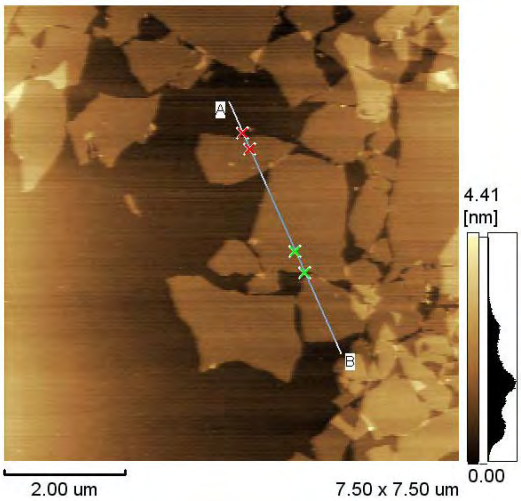
7) Single Layer Graphene Oxide Ethanol Dispersion

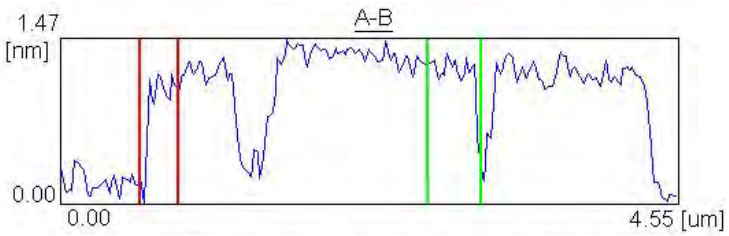
Single Layer Graphene Oxide Dispersion is very stable and can be stored for more than one year without using a surfactant. It is suitable for the preparation of reduced graphene and graphene film.

Preparation Method:	Modified Hummer's Method
Concentration:	5mg/ml. 100ml per bottle (0.5g)
Solvent:	Ethanol
Flake size:	0.5-2.0μm
Thickness:	0.6-1.2nm
Single-layer Ratio:	>80%
Color:	Brown/Black



TEM of Graphene Oxide Dispersion





	Width[um]	Height[nm]	Angle[deg]
—	0.28	0.86	0.17
—	0.39	0.93	0.13

8) Single Layer Graphene Oxide Water Dispersion

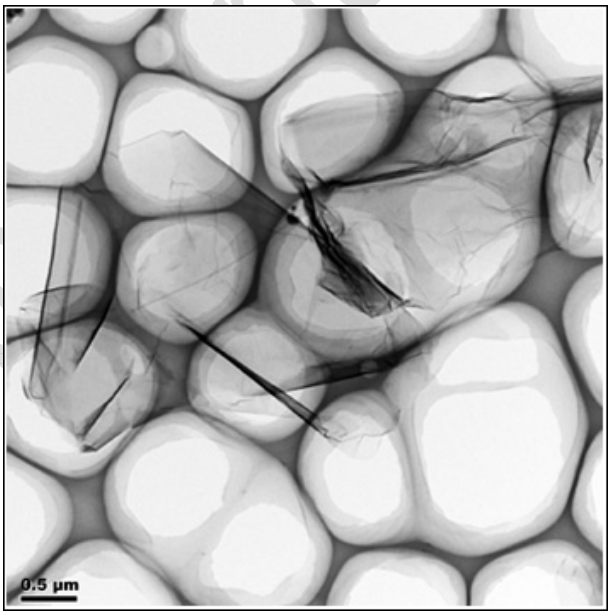
Single Layer Graphene Oxide Dispersion is very stable and can be stored for more than one year without using a surfactant. It is suitable for the preparation of reduced graphene and graphene film.

Product Code: GnO1LD2H2O-1g

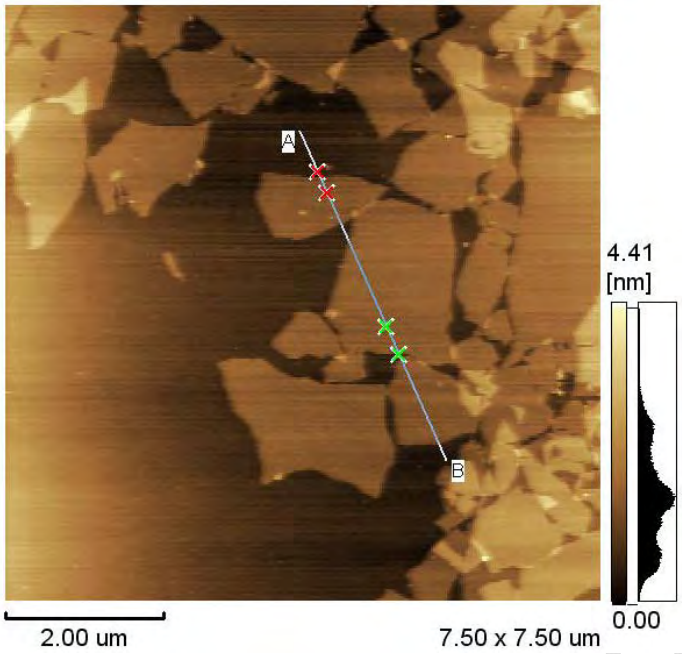
Preparation Method:	Modified Hummer's Method
Concentration:	10mg/ml. 100ml per bottle (1g)
Solvent:	DI Water
Flake size:	0.5-2.0μm
Thickness:	0.6-1.2nm
Single-layer Ratio:	>80%
Color:	Brown/Black

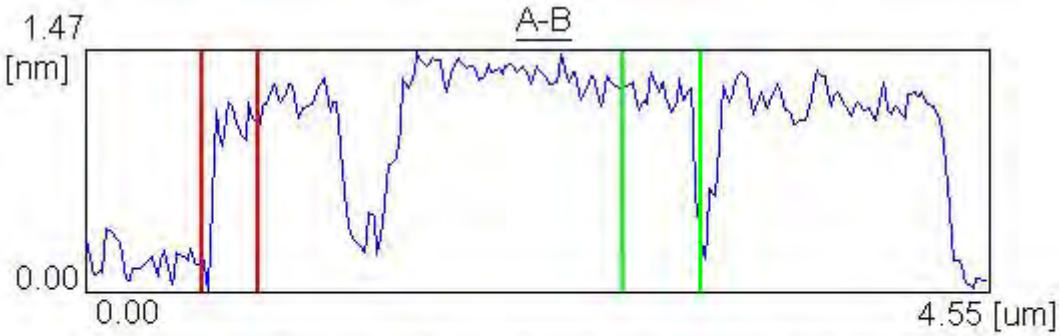
Product Code: GnO1LD.5H2O-0.5g

Preparation Method:	Modified Hummer's Method
Concentration:	5mg/ml. 100ml per bottle (0.5g)
Solvent:	DI Water
Flake size:	~500nm
Thickness:	0.6-1.2nm
Single-layer Ratio:	>80%
Color:	Brown/Black



TEM of Graphene Oxide Dispersion





	Width[um]	Height[nm]	Angle[deg]
—	0.28	0.86	0.17
—	0.39	0.93	0.13

9) Aqueous solution

Product Number: SLGO-DW(MKN)

CAS Number:
Formula: C
Product Details

Single Layer Graphene Oxide (SLGO) in aqueous solution
Graphene Oxide (GO) with 80% carbon, 20% Oxygen.

- Flake size: 0.5-5 microns.
- Thickness: Single atomic layer >80%
- Color: Bright yellow
- Purity: Carbon contents over 80%

10) Graphene Oxide Dispersion

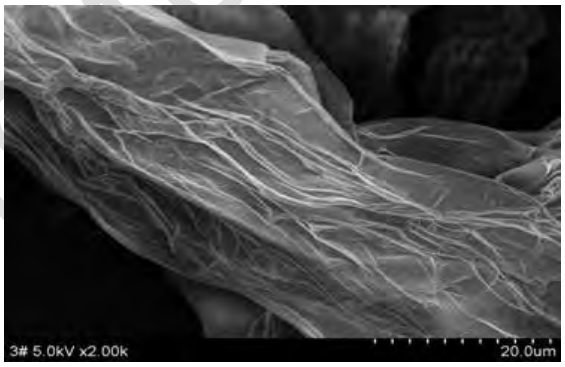
Graphene Oxide Dispersion produced by Royal Elite in a Lab scale has a good stability. We can prepare 0.5-10mg/ml graphene oxide dispersion in DI water, ethanol, DMF, NMP and many other solvents on customer's different requirements. Our high quality dispersion can be stored for several months without using any surface acting agent because of its excellent stability.

Graphene Oxide Dispersion

- Concentration: 1mg/ml 2mg/ml 5mg/ml 10mg/ml
- Solvent: DI water or other solvent
- Thickness: 0.8~1.2nm
- Appearance: Brown/Black solution

Other concentration dispersions can be made available on customer's request.

SEM



Glassy Carbon

1) Crucibles, Boats

Crucibles and boats made of glassy carbon SIGRADUR® G are available in many standard forms. Applications are crucible liners for electron beam evaporation sources, crystal growth crucibles and melting crucibles. Further we can offer to you numerous cylindrical and conical standard crucibles and custom-made products.

2) Dental Crucibles

SIGRADUR® G crucibles and liners are available for the following dental casting machines:
Bego: Fornax
Cowa Erscem: Centricast
DeguDent: TS1, TS1a, TS2, TS3, Multicast Compact, Prestomat A1, Prestomat B1
Dentaurum: Dentaurum
Galloni: Modular Fusus NG
Heraeus: CL-G, CL-G 97, CL-G 77, GL-G 94, GL-G 2002, CL-IM, CL-IG, CL-I-95, Heracast IQ
Linn: DK2-Minitherm, DKV2, HFS 1.6, HFS 3.3 VAC
Manfredi: Multiherz, Century D, Neutrodyn
Schütz: Microtronic

3) Tubes

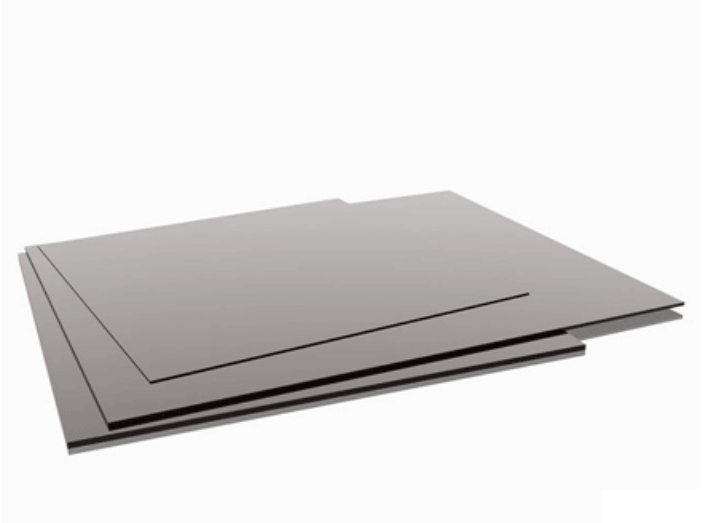
Tubes made of glassy carbon SIGRADUR® G are available in different standard sizes. Other diameters, lengths and custom made tubes are available on request.

4) Rods

Rods made of glassy carbon SIGRADUR® K and SIGRADUR® G are available in diameters from 1 to 10mm and various lengths. On request we produce custom-made products.

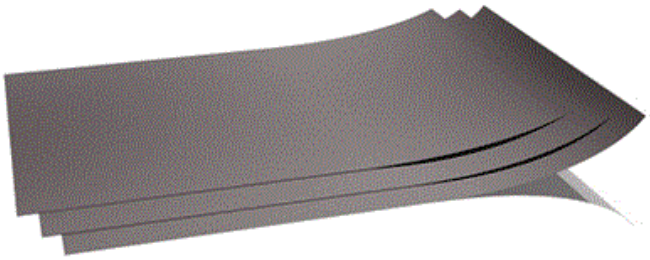
5) Plates

Plates made of glassy carbon SIGRADUR® K and SIGRADUR® G are available in thicknesses from 0.5 to 6mm. On request the surface can be lapped or polished.



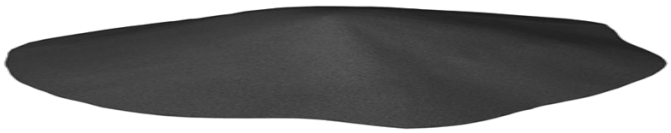
6) Films

Films made of glassy carbon SIGRADUR® K are available with 60µm, 100µm, 140µm and 180µm thickness.



7) Powders

Powders made of glassy carbon SIGRADUR® K and SIGRADUR® G are available in the following particle sizes:
0.4 – 12µm
10 – 20µm
20 – 50µm
40 – 80µm
80 – 200µm
200 – 400µm
400 – 630µm
630 – 1000µm
1000 – 2000µm
2000 – 3150µm
3150 – 4000µm



NovaScientific

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Website: www.novascientific.com.my, www.materials-A2Z.com