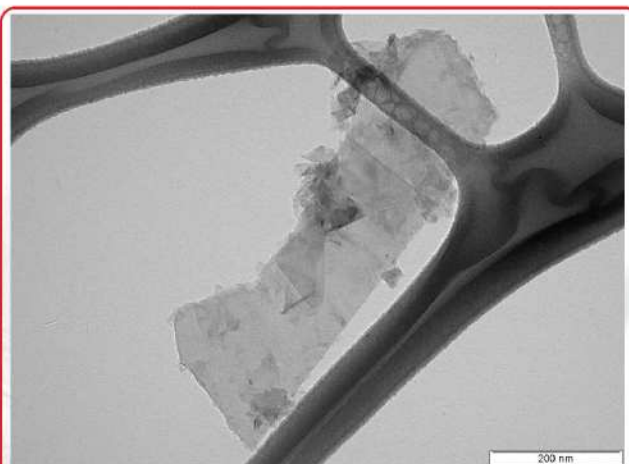


# Technical Data Sheet

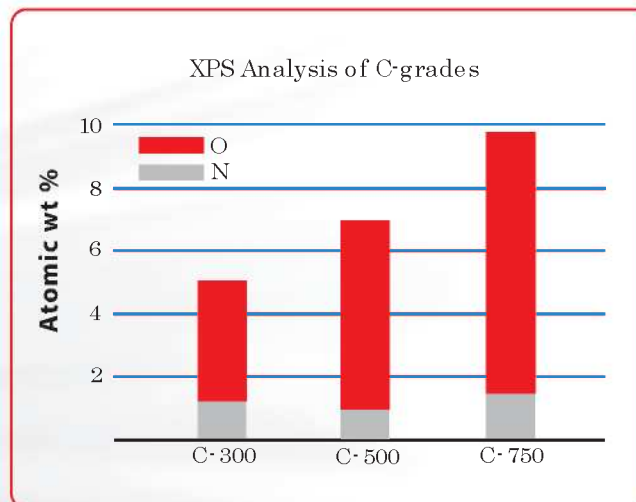
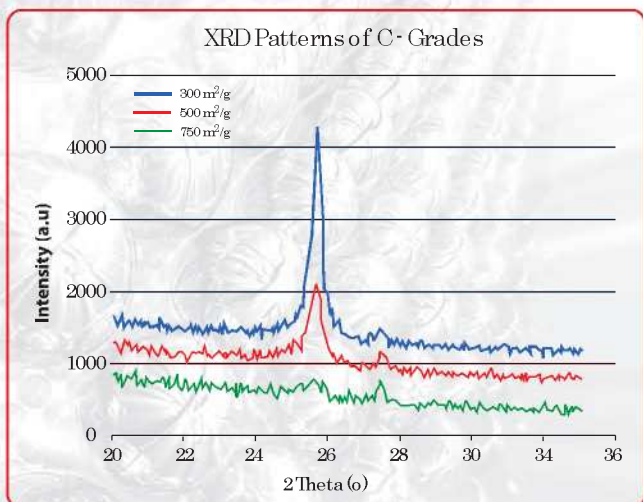
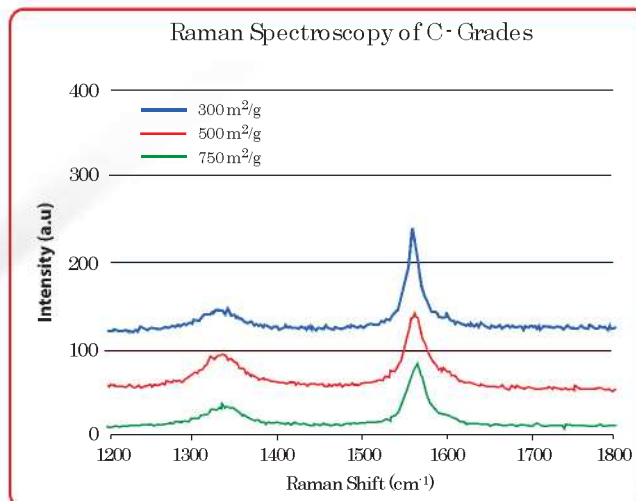
## xGnP® Graphene Nanoplatelets - Grade C

xGnP® Graphene Nanoplatelets are unique nanoparticles consisting of short stacks of graphene sheets having a platelet shape. Grade C particles are available in different grades that are designated by their approximate surface area.

Grade C particles typically consist of aggregates of sub-micron platelets that have a particle diameter of less than 2 microns and a typical particle thickness of a few nanometers, depending on the surface area. Grade C particles can be ordered with average surface areas of 300, 500 and 750 m<sup>2</sup>/g.



TEM Image of nearly transparent platelet - 750 m<sup>2</sup>/g



### Characteristics of Bulk Powder

Property	Typical Value
Appearance	Black granules/powder
Bulk Density	0.2 to 0.4 g/cc
Oxygen Content*	< 2 wt %
Carbon Content*	> 98.0 wt%

\*Note: nanoplatelets have naturally occurring functional groups like ethers, carboxyls, or hydroxyls that can react with atmospheric humidity to form acids or other compounds. These functional groups are present on the edges of the particles and their wt% varies with particle size.

XGSciences believes the information in this technical data sheet to be accurate at publication. XGSciences does not assume any obligation or liability for the information in this technical data sheet. No warranties are given. All implied warranties of fitness for a particular purpose are expressly excluded. No freedom from infringement of any patent owned by XGSciences or other is to be inferred. XGSciences encourages its customers to review their manufacturing processes and applications for xGnP Graphene Nanoplatelets from the standpoint of human health and environmental quality to ensure that this material is not utilized in ways that it is not intended or tested. Product literature and safety data sheets should be consulted prior to use. Please contact XGSciences or [www.xgsciences.com](http://www.xgsciences.com) for the most current technical information.

# Technical Data Sheet

## xGnP® Graphene Nanoplatelets - Grade M

xGnP® Graphene Nanoplatelets are unique nanoparticles consisting of short stacks of graphene sheets having a platelet shape. Each grade contains particles with a similar average thickness and surface area.

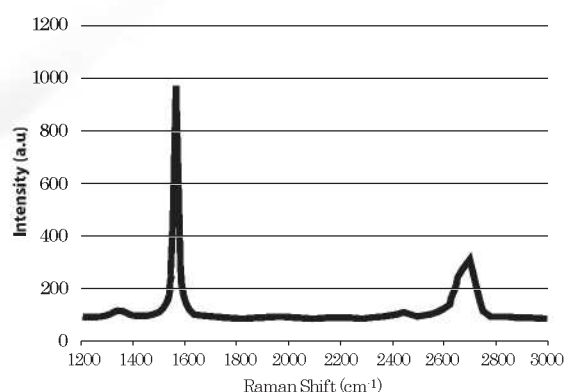
Grade M particles have an average thickness of approximately 6 - 8 nanometers and a typical surface area of 120 to 150 m<sup>2</sup>/g. Grade M is available with average particle diameters of **5, 15** or **25** microns.

### Characteristics of Bulk Powder

Property	Typical Value
Appearance	Black granules
Bulk Density	0.03 to 0.1 g/cc
Oxygen Content*	< 1 percent
Residual Acid Content*	< 0.5 wt%

\*Note: nanoplatelets have naturally occurring functional groups like ethers, carboxyls or hydroxyls that can react with atmospheric humidity to form acids or other compounds.

Raman Spectroscopy of xGnP® Graphene Nanoplatelets



### Typical Properties of xGnP® Graphene Nanoplatelets

Property	Typical Value - Parallel to Surface	Typical Value - Perpendicular to Surface	Unit of Measure
Density	2.2	2.2	grams/cc
Carbon Content	>99.5	>99.5	percent
Thermal Conductivity	3,000	6	watts/meter K
Thermal Expansion (CTE)	4-6 x 10 <sup>-6</sup>	0.5- 1.0 x 10 <sup>-6</sup>	m/m/deg. K
Tensile Modulus	1,000	na	GPa
Tensile Strength	5	na	GPa
Electrical Conductivity	10 <sup>7</sup>	10 <sup>2</sup>	siemens/meter

XG Sciences believes the information in this technical data sheet to be accurate at publication. XG Sciences does not assume any obligation or liability for the information in this technical data sheet. No warranties are given. All implied warranties of fitness for a particular purpose are expressly excluded. No freedom from infringement of any patent owned by XG Sciences or others is to be inferred. XG Sciences encourages its customers to review their manufacturing processes and applications for xGnP Graphene Nanoplatelets from the standpoint of human health and environmental quality to ensure that this material is not utilized in ways that it is not intended or tested. Product literature and safety data sheets should be consulted prior to use. Please contact XG Sciences or [www.xgsciences.com](http://www.xgsciences.com) for the most current technical information.

# Technical Data Sheet

## xGnP® Graphene Nanoplatelets - Grade H

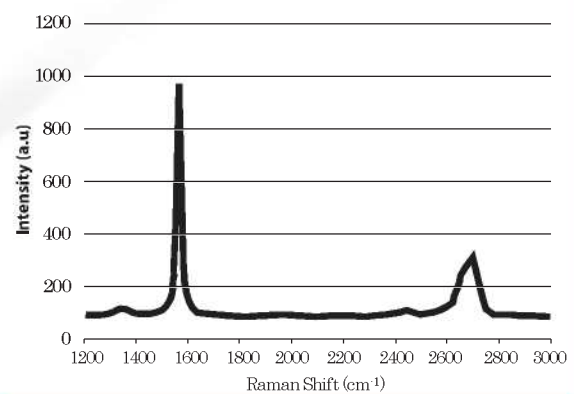
xGnP® Graphene Nanoplatelets are unique nanoparticles consisting of short stacks of graphene sheets having a platelet shape. Each grade contains particles with a similar average thickness and surface area.

Grade H particles have an average thickness of approximately 15 nanometers and a typical surface area of 50 to 80 m<sup>2</sup>/g. Grade H is available with average particle diameters of **5, 15** or **25** microns.

### Characteristics of Bulk Powder

Property	Typical Value
Appearance	Fine black powder
Bulk Density	0.05 to 0.25 g/cc
Oxygen Content	3 to 4 percent
Residual Acid Content	< 0.05 wt%

Raman Spectroscopy of xGnP® Graphene Nanoplatelets



### Typical Properties of xGnP® Graphene Nanoplatelets

Property	Typical Value - Parallel to Surface	Typical Value - Perpendicular to Surface	Unit of Measure
Density	2.2	2.2	grams/cc
Carbon Content	>99.5	>99.5	percent
Thermal Conductivity	3,000	6	watts/meter K
Thermal Expansion (CTE)	4-6 x 10 <sup>-6</sup>	0.5- 1.0 x 10 <sup>-6</sup>	m/m/deg. -K
Tensile Modulus	1,000	na	GPa
Tensile Strength	5	na	GPa
Electrical Conductivity	10 <sup>7</sup>	10 <sup>2</sup>	siemens/meter

XG Sciences believes the information in this technical data sheet to be accurate at publication. XG Sciences does not assume any obligation or liability for the information in this technical data sheet. No warranties are given. All implied warranties of fitness for a particular purpose are expressly excluded. No freedom from infringement of any patent owned by XG Sciences or others is to be inferred. XG Sciences encourages its customers to review their manufacturing processes and applications for xGnP Graphene Nanoplatelets from the standpoint of human health and environmental quality to ensure that this material is not utilized in ways that it is not intended or tested. Product literature and safety data sheets should be consulted prior to use. Please contact XG Sciences or [www.xgsciences.com](http://www.xgsciences.com) for the most current technical information.