

PRIME Graphene Oxide Single Layer Nanosheets

The first graphene samples were obtained by peeling off a single layer of graphite using Scotch tape. While this process is simple and straight forward, it is not practical for graphene manufacture. Over the past decade, several other approaches have been developed for the preparation of graphene, such as chemical vapor deposition, epitaxial growth, liquid phase exfoliation and chemical approach through the oxidation and reduction of graphite oxide. Out of these methods, the chemical approach shows greater potential for large scale manufacturing due to the facile functionalization of graphene oxide and its excellent dispersibility in water. In fact, graphene oxide is currently being explored in many companies and research labs around the world as a precursor to graphene. Our process demonstrates good control over the carbon/oxygen content and exhibits a higher surface area than any of the GO products available in the market. Pimata offers monolayer graphene oxide in manufacturing quantities for mainstream commercial applications. Graphene Oxide is available as an aqueous, extensively washed paste – which is significantly more concentrated than regular graphene oxide solutions. It is worth noting that the paste form is safer for the storage and transportation of large quantities of graphene oxide. In addition to its use as a precursor to graphene, graphene oxide can be used in a variety of applications from surfactants, photonics and optoelectronic devices to water filtration and protective coatings.



PRODUCT SELECTION

Graphene oxide is available in different physical states, concentrations and quantities. Please see our website for product selections and pricing.

APPLICATIONS

- Graphene research
- Energy conversion
- Energy storage
- Electronics
- Conductive inks and coatings
- Composites
- Catalysis
- Biomedical
- Membranes
- Sensors and biosensors
- Gas separations
- Surfactant

Item 901500

Product Specifications

Appearance	Paste
Color	Brown
Odor	Odorless
Solid Content (Conc)	5-10% (w/w)
Solvent	Water
pH of the product	1.9-3.0
Apparent (tapped) density	0.9- 1.05 g/cm ³
Carbon content (XPS)	69.2 % (atomic)
Oxygen content (XPS)	27.6% (atomic)
Ash (XPS)	<3.2 % (atomic)
Lateral size of GO sheets ¹	D90: 2.2 μm; D50: 0.77 μm; D10: 0.29 μm (precision ±20%)
Number of layers ²	Single atomic layers ≈ 91.5%

1. Lateral size of GO nanosheets measured using SEM.

2. Single atomic layers can be achieved by dispersing GO in water followed by sonication for at least 5 min (probe) or 30 min (bath).

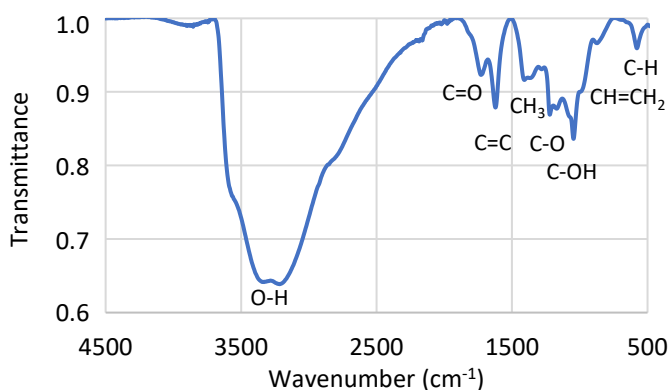
ELEMENTAL ANALYSIS

Carbon	40-42 wt%
Hydrogen	1.5-3.1 wt%
Nitrogen	<0.3 wt%
Oxygen	44-46 wt%

The elemental analysis of Graphene Oxide exhibit a high oxygen content up to 46 wt%. The high oxygen content makes our graphene oxide rich with active functional groups, such as hydroxyl, epoxide, carbonyl, and carboxyl, and promotes high solubility in polar solvents. It also demonstrates great potential for further chemical functionalization.

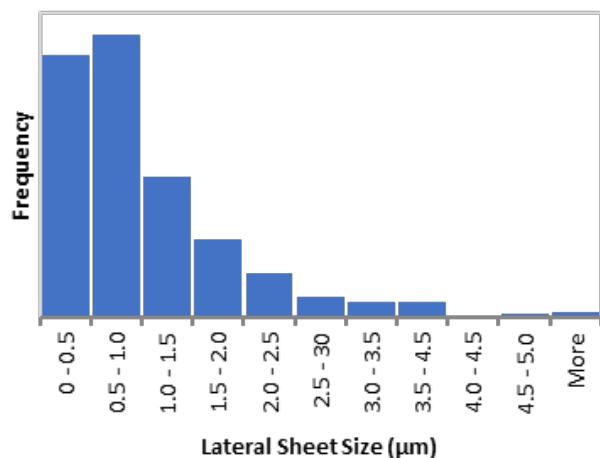
FTIR

FTIR of Graphene Oxide confirming the existence of various functional groups including -OH, C=O, and C-O-C.



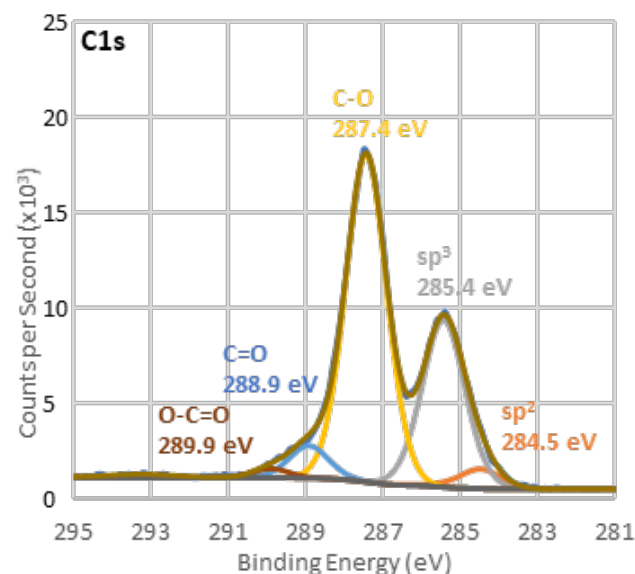
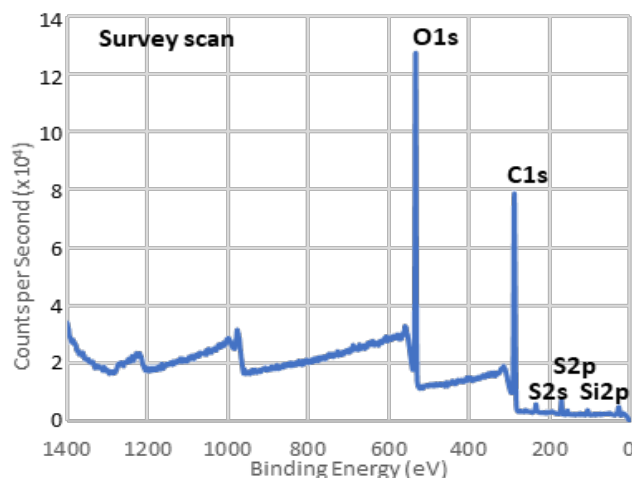
FLAKE SIZE DISTRIBUTION

Size distribution of GO: The GO flake size calculated from an AFM topography image of a GO film using ImageJ software.



XPS ANALYSIS

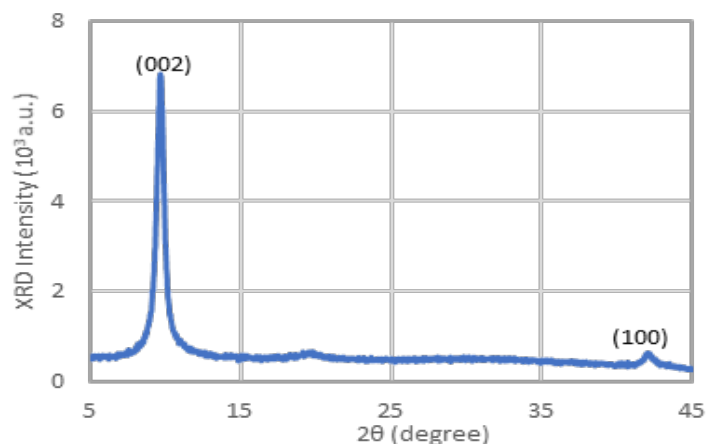
The XPS scan of Graphene Oxide gives 69.2 at% of carbon and 27.6 at% of oxygen with trace amount of sulfur (1.6 at%) and silicon (1.2 at%). The high-resolution C1s spectrum of Graphene Oxide can be deconvoluted into five peaks corresponding to sp^2 carbon (284.5 eV), sp^3 carbon (285.4 eV), C-O (287.4 eV), C=O (288.9 eV), and O-C=O (289.9 eV). The relative intensities of the peaks provide an idea about the contribution of each functional group.



C Species	Peak BE (eV)	Percentage (%)
sp^2	284.5	3.3
sp^3	285.4	30.8
C-O	287.4	57.9
C=O	288.9	5.5
O-C=O	289.9	1.4

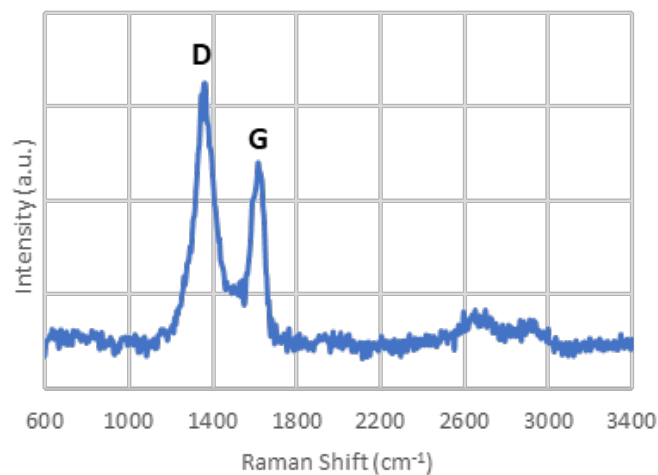
X-RAY POWDER DIFFRACTION

The XRD peak of Graphene Oxide at $2\theta = 9.60^\circ$ corresponds to an interlayer spacing of 0.92 nm due to the introduction of oxygen functional groups. The peak at $2\theta = 26.4^\circ$, which arises from 0.34 nm graphite stacking, is absent, indicating effective exfoliation.



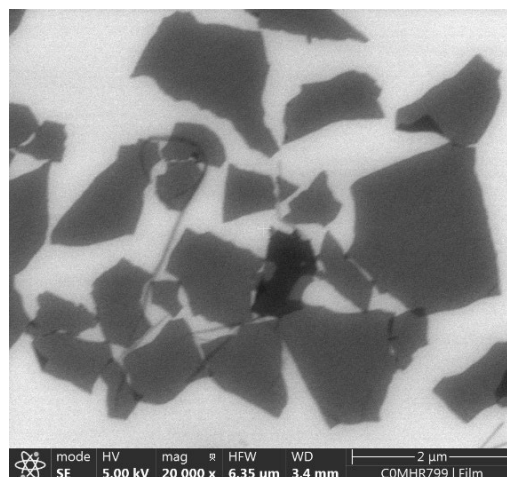
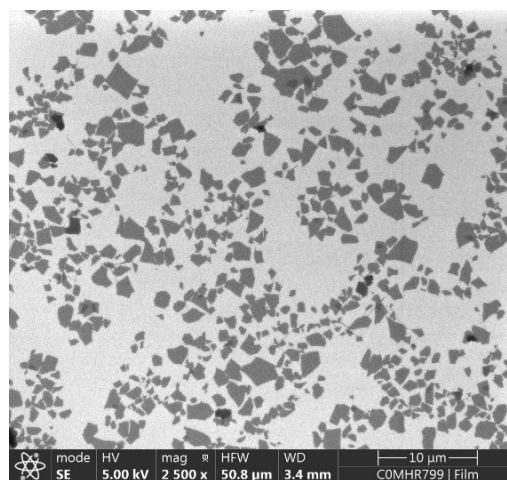
RAMAN SPECTROSCOPY

Raman spectra shows two intense peaks at 1350 and 1600 cm^{-1} corresponding to sp^3 and sp^2 hybridized carbons.



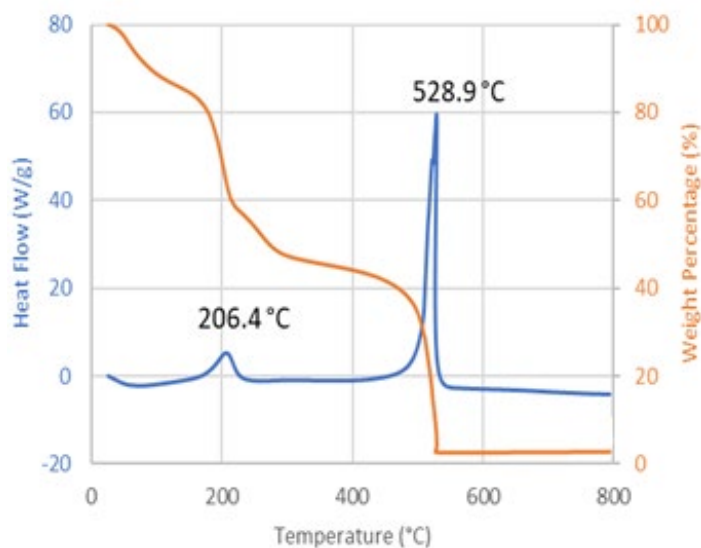
SEM MICROSCOPY

SEM images confirm that Graphene Oxide exists mostly in the monolayer form. Analysis shows that the GO sheets are 91.5% monolayers while the rest is self-folded monolayers and bilayers.



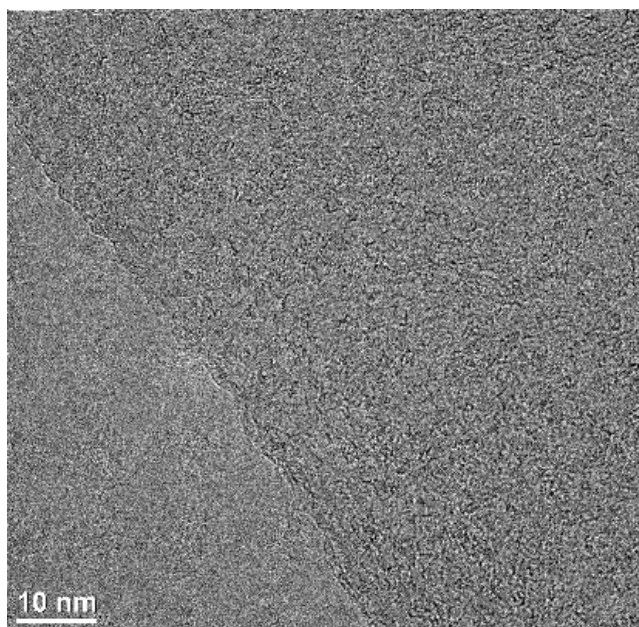
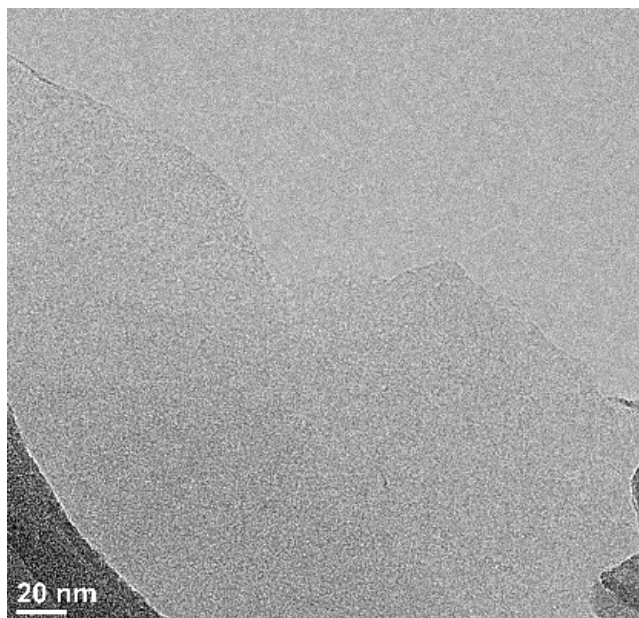
THERMAL ANALYSIS

TGA reveals two peaks corresponding to thermal reduction at 206.4 $^\circ\text{C}$ and combustion at 528.9 $^\circ\text{C}$.



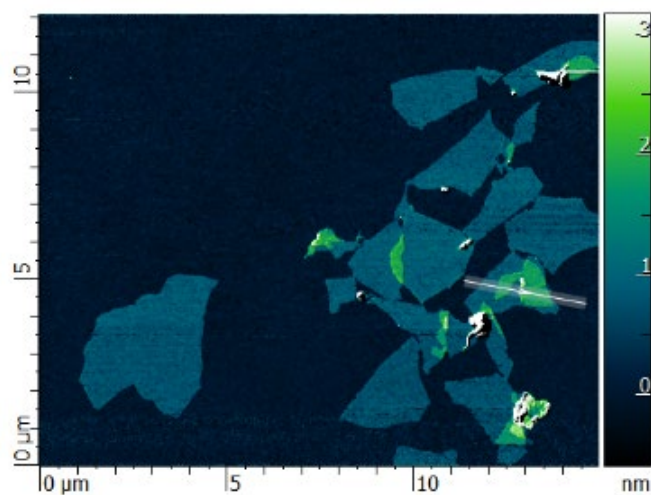
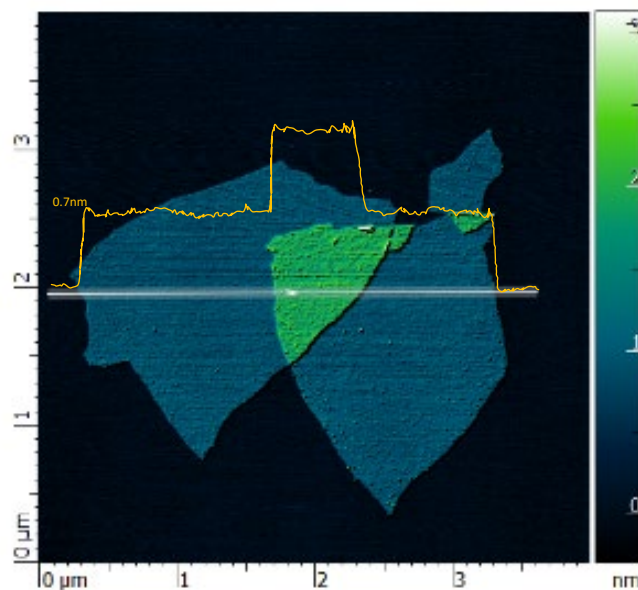
TEM MICROSCOPY

TEM images of the edge of Graphene Oxide nanosheets prove the true monolayer nature of the product



AFM MICROSCOPY

AFM images of the deposited Graphene Oxide nanosheets indicate the successful exfoliation down to the monolayer level. The height of the Graphene Oxide nanosheets is 0.7-1.2 nm thanks to the rich functional groups on their surface.



Disclaimer: The information claimed is believed to be accurate. Pimata holds no guarantee to the accuracy of data and no liability in connection with damages when using the product.

Last revised 9/23/2026 v1.1