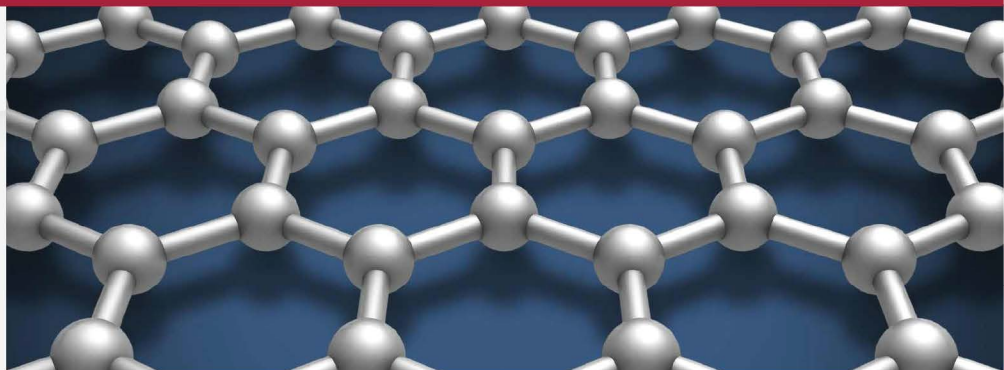


## Graphene Characterization Service



### Materials Analysis



### Why Work with Us?



**Expertise in Graphene Analysis**  
Highly experienced with advanced technology



**Affordable Price**  
Up to 40% lower than industry pricing



**Free Consultation**  
Before and after service



**In-Depth Data Interpretation**  
As a second opinion to yours



**Quality Assurance Program**  
Free remeasurement if not satisfied

### Advanced Graphene Applications



#### Objective

Surface topography

Distinguish single vs. multilayer

Count average number of layers

Measure atomic layers thicknesses



#### Solution

**AFM**

**Nano-Raman**

**XRD**

**C<sub>s</sub>-TEM\***

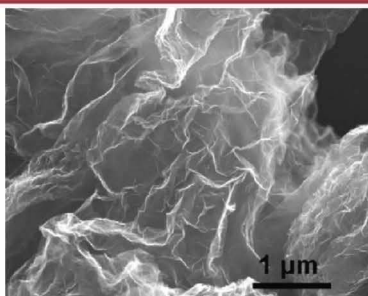
\*C<sub>s</sub>-TEM: Aberration corrected TEM which has 5x higher resolution than HR-TEM

### Graphene Applications

Microscopy	Visualization of graphene from macroscopic to atomic level: 3D-CT, AFM, Dual Beam FIB/SEM, SQUID, SEM, TEM, C <sub>s</sub> -TEM
Scattering	Analysis of graphene crystal structure & impurities: ToF SIMS, XRR, XRD, XRF
Chemical Analysis	Quantitative elemental analysis of graphene: d-AES, d-XPS, ToF SIMS, EDS, EELS
Spectroscopy	Characterization of graphene chemical bonding states: Fluorescence, FTIR, Nano-FTIR, Raman, Nano-Raman, UV-VIS
Chromatography	Detection of graphene decomposition products: GC-MS, TGA-GC-MS, IC-MS, HPLC-MS, HPLC-MS-MS, UPLC
Thermal & Mechanical	Measurement of graphene thermal and mechanical properties: Porosimetry, TMA, DSC, TGA, Nano-indentor

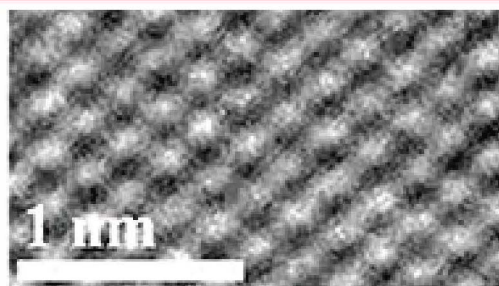


### SEM-EDS



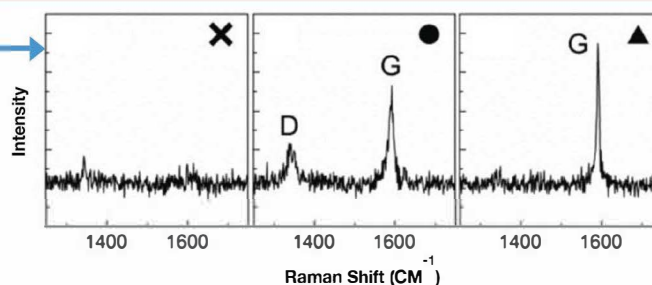
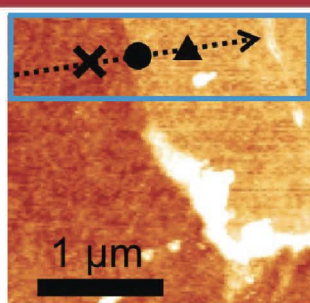
Routine imaging of raw materials

### C<sub>s</sub>-TEM-STEM-EDS-EELS



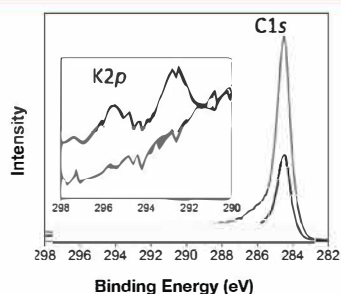
Highest resolution imaging of graphene layer thickness

### Nano-Raman



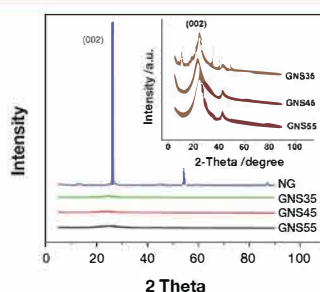
Combined AFM and Raman surface measurement

### XPS



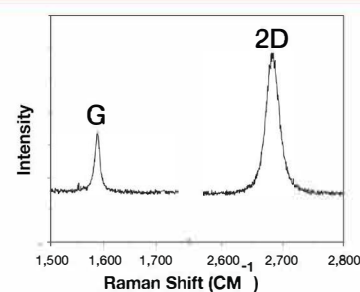
Deconvolutes chemical bonds

### XRD



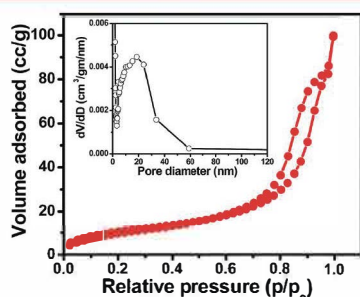
Distinguishes graphite, graphite oxide & graphene

### Raman



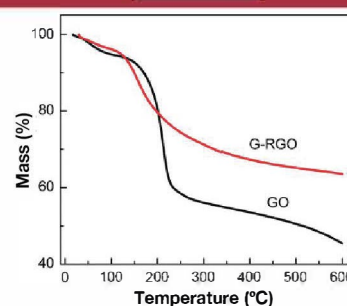
Resolves chemical bonding and D/G ratios

### BET



Measures graphene surface area

### TGA/DSC



Characterizes thermal properties

Image Credits: SEM and XRD from Du et al (2010), TEM from Pham (2018), Raman and XPS from Xia et al (2009), Nano-Raman from Iwasaki et al (2017), BET from Bera (2016), TGA from Zhang (2012)

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