Few-Layer Graphene, 500-1000 nm

BioGraph Solutions

Characterization of the pre-lyophilized water solution:

- **[Graphene]** = 0.103 mg/ml (by weighting)
- **[Melamine]** = 0.64 ppm (by AuNp method)[1]

Characterization of the lyophilized powder:

- **Thermogravimetric Analysis (TGA) - Graphene (N_2 -600 ºC)** = 5.46%

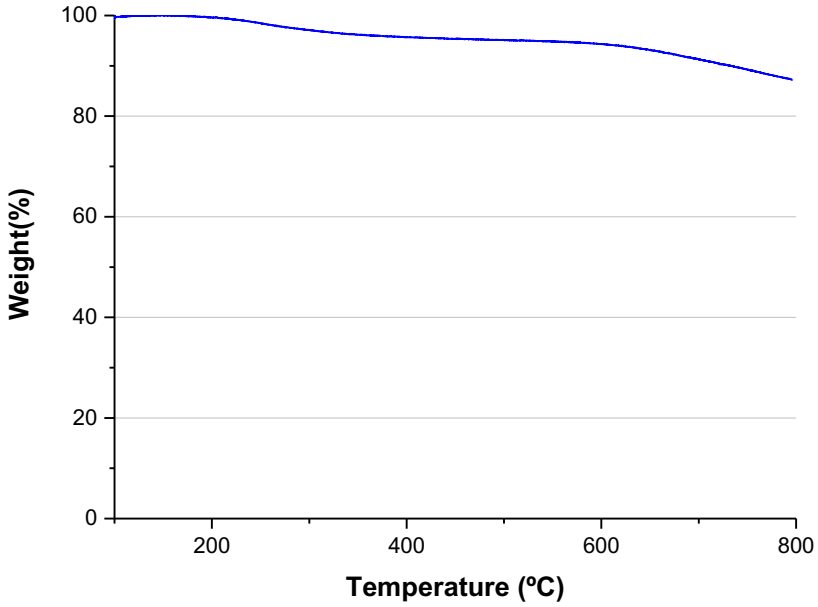


Figure 1. Thermogravimentric analysis of Graphene.

- **Elemental Analysis** (average):
  93.58±0.31 Wt%C - 0.55±0.01 Wt%H - 0.50±0.007 Wt%N - 0.55±0.01 Wt%S
  → wt% melamine (%N) = 0.75%
- **Sheet Resistance:** 7.35 ± 0.25 Ω/ sq
- **Total Reflection X-ray Fluorescence** (TXRF): 0.087 mg/L Fe

[1] E. Vázquez *et al.,* Gold nanoparticles as analytical tools for the quantification of small quantities of triazine derivatives anchored on graphene in water dispersions. *RSC Adv.* 7, 21982-21987, (**2017**).

Element	Line	Conc. (mg/L)	Sigma (mg/L)	RSD (%)	LLD (mg/L)	Net area	Backgr.	Chi
Si	K12	79.27	0.69	0.9	0.34	17076	613	2.41
S	K12	1.792	0.065	3.6	0.090	1417	558	0.81
Cl	K12	0.066	0.028	42.3	0.057	86	614	1.32
K	K12	0.141	0.013	9.5	0.024	402	517	0.63
Ca	K12	0.993	0.020	2.0	0.020	3422	505	0.99
Ti	K12	6.843	0.038	0.6	0.011	45034	602	0.92
V (IS)	K12	5.000	0.029	0.6	0.010	41476	728	0.94
Fe	**K12**	**0.087**	**0.003**	**3.3**	**0.003**	**1388**	**312**	**1.06**
Ni	K12	0.005	0.001	23.8	0.002	113	302	1.19
Cu	K12	0.050	0.002	3.3	0.002	1367	293	1.02
Zn	K12	0.084	0.002	2.2	0.002	2665	296	1.10
Br	K12	0.008	0.001	7.4	0.001	402	235	0.76

- **Raman spectroscopy:**
  - FWHM (2D) = 64.25cm^{-1}
  - I(D)/I(G) = 0.36
  - I(2D)/I(G) = 0.51
  - Number of layers[2] = 4

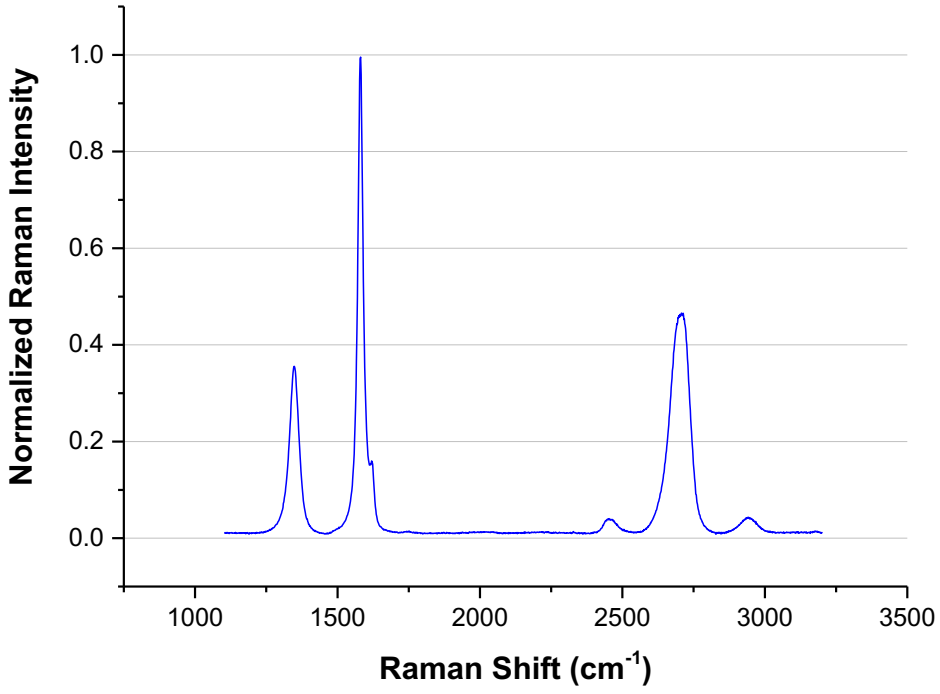


Figure 2. Normalized Raman spectrum of Graphene at 532 nm.

[2] K. R. Paton *et al.,* Scalable production of large quantities of defect-free few-layer graphene by shear exfoliation in liquids. *Nat. Mater.* 13, 624-630 (**2014**).

- **Transmission Electron Microscope (TEM):**
  Average size: 500 ± 42 nm

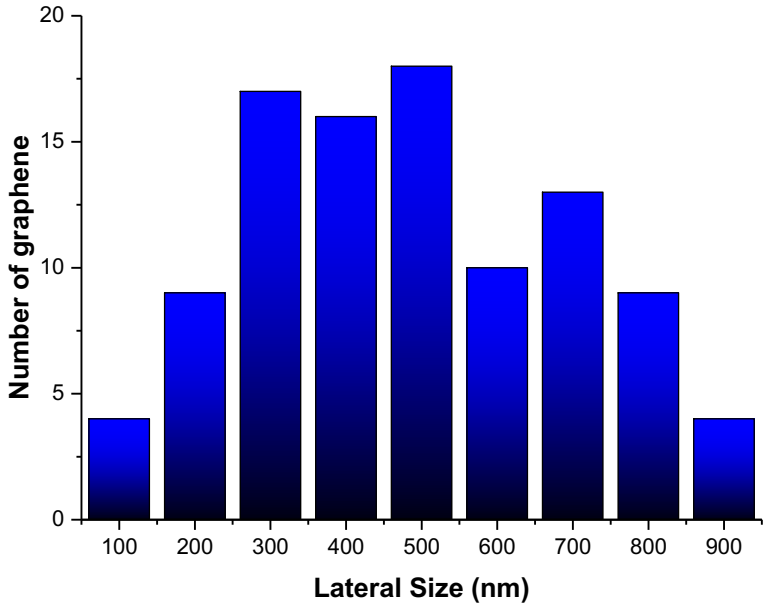
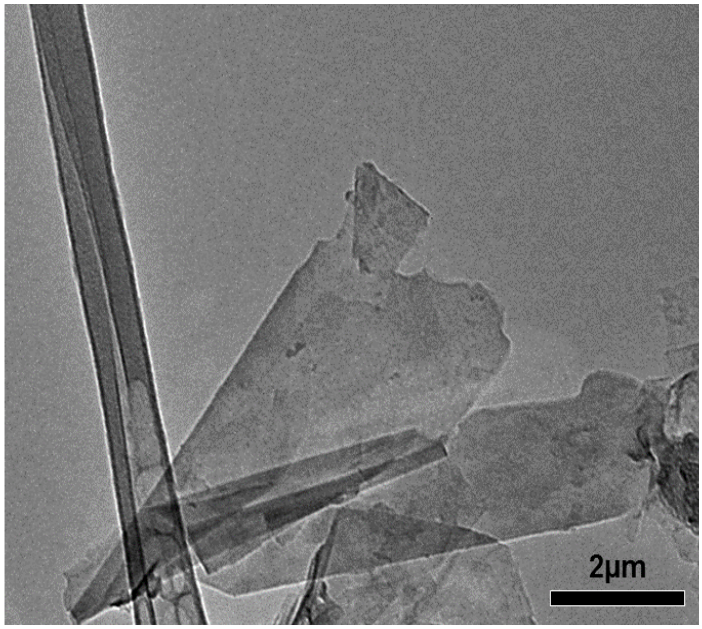


Figure 3. Lateral size distribution of ball-milled graphene from TEM images of Graphene



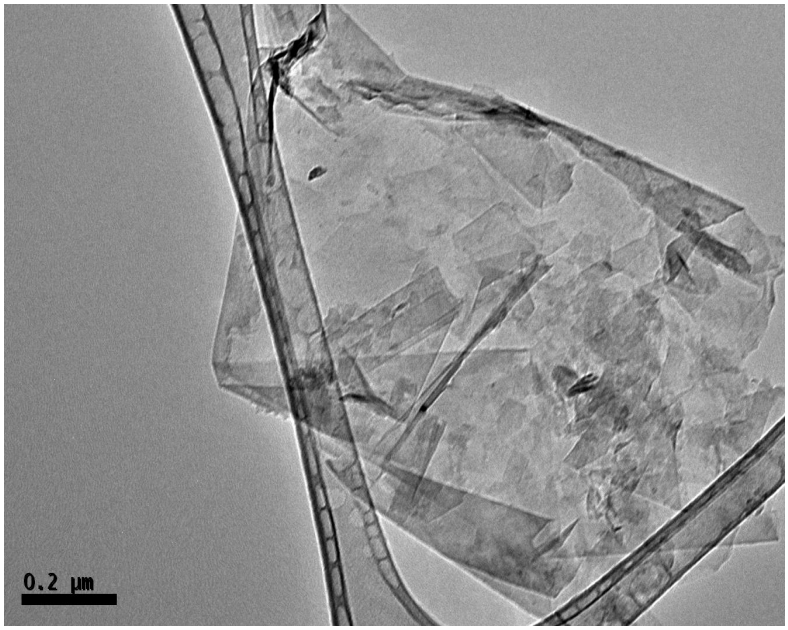


Figure 4. Representative TEM images of Graphene

➢ **Recommendations for use:**

- It must be stored at room temperature.

- The sample is very stable in aqueous solution. It can be even dispersed directly in culture medium (until 0.1 mg/mL) just before using, as it is stable for several hours. Stabilizing agents are not necessary. It is possible to weight the amount of powders needed and disperse them in the necessary volume of solvent to reach the desired concentration.

- Sonication treatment (10 seconds cycles, maximum 2 minutes) are enough to obtain a good dispersion.