An innovative method of graphite exfoliation in an aqueous-organic medium

Abrantes, Vitor Emanuel
Figueiredo, Bruno Reis
Silva, Rui Pedro

Graphenest, Lugar da Estação, Edifício VougaPark, 3740-070 Paradela do Vouga, Sever do Vouga, Portugal

contact@graphenest.com

Graphene is an extremely promising material with unique properties and unlimited potential, capable of disrupting several markets [2] – due to its thermal/electrical conductive properties, flexibility and strength, graphene has been hailed as the future of nanomaterials, and can be used in energy storage, in composites, medical diagnostics and drug delivery systems, or even in such concepts as folding smartphones. The present work is related with an innovative process for producing high quality graphene, affordably and efficiently, and on a scale capable of meeting the potential market demand for graphene, using a proprietary system. This system is based on a thermochemical-mechanical process which achieves liquid exfoliation of graphite using ultrasonic waves to form cavitation bubbles in a non-contaminant chemical solution, which impact the graphite and break it into graphene particles (see Figure 1). Figure 2 presents several Raman spectra from different sources where two (green and magenta) were obtained with the previously described system, and the remaining blue [3], red [1] and black [4] spectra are from literature for 4- and 5-layer graphene particles.

References

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[2] J.H. Warner, F. Schaffel, M. Rummeli, A. Bachmatiuk, Graphene fundamentals and emergent applications, Elsevier, 2013.
[3] Y. Hao, Y. Wang, L. Wang, Z. Ni, Z. Wang, R. Wang, C.K. Koo, Z. Shen, J.T.L. Thong, Small, 6 (2010) 195–200.
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Figures

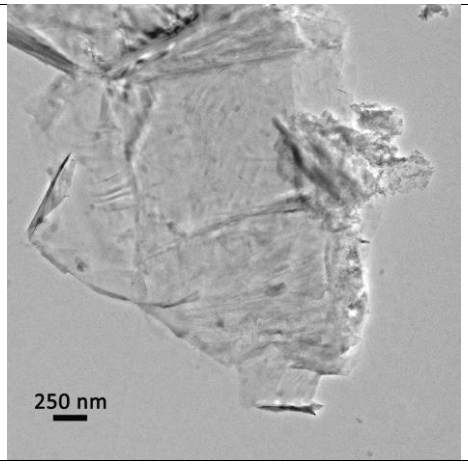

Figure 1: Transmission electron microscopy bright-field image of a Graphenest sample.

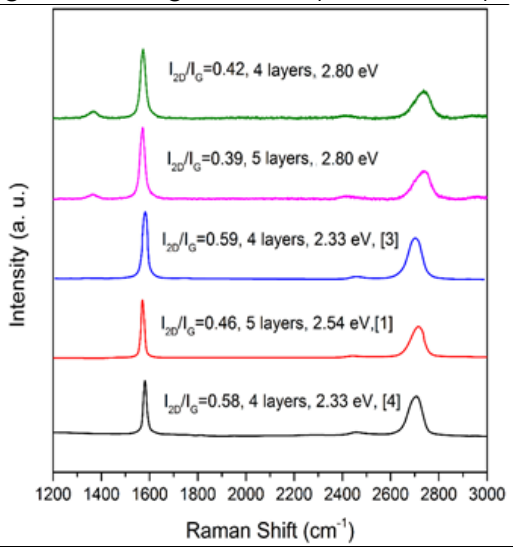

Figure 2: Normalized Raman spectra of few-layer graphene (FLG) particles from different sources. Green and magenta spectra were obtained during the present work, while blue [3], red [1] and black [4] spectra are from literature for 4- and 5-layer graphene particles.