

Facile synthesis of high quality metal free reduced graphene nanosheets from expandable graphite oxide

Nanjundan Ashok Kumar, Lionel Dubois,* Serge Gambarelli, Florence Duclairoir and Gérard Bidan‡

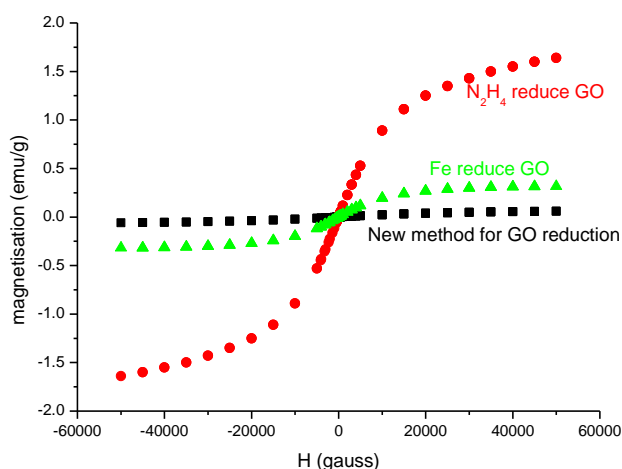
Laboratoire de Chimie Inorganique et Biologique, UMR-E CEA-UJF,
Institute for Nanoscience and Cryogenics,
Commissariat à l'énergie atomique (CEA),
17 rue des martyrs, 38054, Grenoble, Cedex 09 FRANCE.
‡ INAC/DIR, CEA-Grenoble
E-mail: lionel.dubois@cea.fr

A cost-effective, one-pot and environmentally benign process for reducing graphene oxide at room temperature is reported. High quality metal free and spectroscopically pure graphene nanosheets were obtained via metal induced reduction of expandable graphene oxide. Simultaneous exfoliation and reduction is achieved wherein, the reduction process is complete in a facile process. Magnetic measurements and EPR studies show that the prepared graphene is spectroscopically pure and no paramagnetic metallic impurities are detected. Due to its high purity, this graphene is particularly well suited to study the effect of magnetic or electronic doping and as a support for catalyst.

References

- [1]. C. N. R. Rao, A. K. Sood, K. S. Subrahmanyam and A. Govindaraj, *Angewandte Chemie - International Edition*, 2009, 48, 7752-7777.
- [2]. C. Soldano, A. Mahmood and E. Dujardin, *Carbon*, 2010, 48, 2127-2150.
- [3]. J. Wu, W. Pisula and K. Mullen, *Chemical Reviews*, 2007, 107, 718-747.
- [4]. Y. Sun, Q. Wu and G. Shi, *Energy & Environmental Science*, 2011, 4, 1113.
- [5]. Y. Wang, Z. Li, J. Wang, J. Li and Y. Lin, *Trends in Biotechnology*, 2011, 29, 205-212.
- [6]. D. A. C. Brownson, D. K. Kampouris and C. E. Banks, *Journal of Power Sources*, 2011, 196, 4873-4885.
- [7]. Z. Xu, H. Li, W. Li, G. Cao, Q. Zhang, K. Li, Q. Fu and J. Wang, *Chemical Communications*, 2011, 47, 1166-1168.
- [8]. S. Guo and S. Dong, *Chemical Society Reviews*, 2011, 40, 2644-2672.

Figures



Magnetic moment as a function of the magnetic field at 1.8K