One-Pot Greener Reduction and Magnetization of Graphene Oxide Sandwich structures for Trapping Toxic Chromium (VI) Contaminants

Ganesh Gollavelli[a] and Yong-Chien Ling[a]*

[a]Department of Chemistry, National Tsing Hua University, Hsinchu, Taiwan 30013

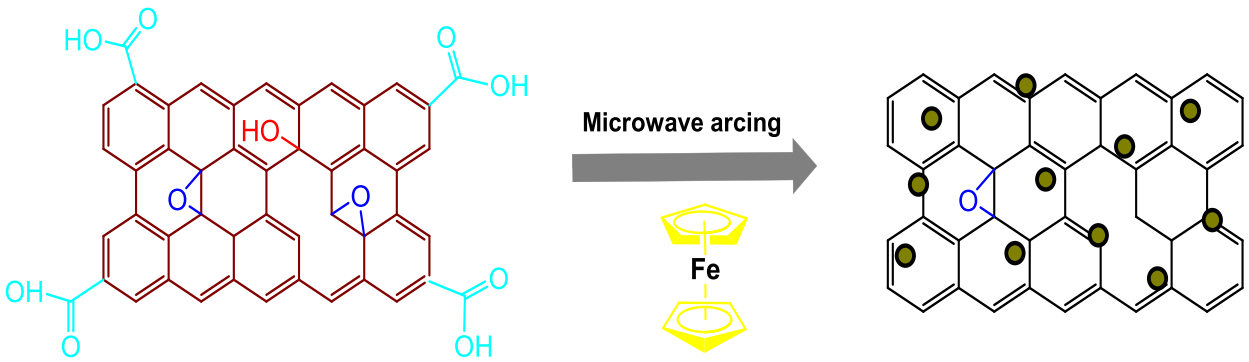
Contact @ E-mail: ganesgollavelli@gmail.com

In recent years, Graphene has explored versatile applications in nano electronics, sensors and biomedical diagnosis etc. Several synthetic strategies were developed to obtain reduced and magnetic graphene oxide (rMGO). Many of them, however, are either time-consuming, multi-step or require the use of highly toxic or environmentally unfriendly reagents. It is necessary to develop a simple, rapid and green synthetic process to achieve reduction and magnetization of graphene oxide. In this report, a facile in-situ solid-state microwave induced process was developed to facilitate the reduction and magnetization in one pot. The obtained rMGO sandwich structures were well characterized by the spectroscopic and microscopic techniques. The bare rMGO possess excellent magnetic property and efficient binding capacity for Cr (VI), whose presence was considered to be the most toxic and carcinogenic in the ecological system. Through the comprehensive exploration of adsorption experiments, it has proven possible to create the first example of reduced magnetic graphene oxide based adsorbant for trapping chromium metal contaminants with almost 99.9% removal efficiencies. The discovery of simple, rapid, facile and green synthesis of rMGO will provide new opportunities for research that exploits the blend and synergism of graphene oxide for environmental applications.

References

[1] Vimlesh Chandra, Jaesung Park, Young Chun, Jung Woo Lee, In-Chul Hwang,* and Kwang S. Kim*, ACS Nano, **4** (2010) 3979.
[2] Di Zhang, Suying Wei, Chandana Kaila, Xin Su, Ji Wu, Amar B. Karki, David P. Young and Zhanhu Guo, Nanoscale, **2** (2010) 917.
[3] Yanwu Zhu, Shanthi Murali, Meryl D. Stoller, Aruna Velamakanni, Richard D. Piner, Rodney S. Ruoff, Carbon, **48** (2010) 2106.

Figure



Schematic procedure for the synthesis of reduced magnetic graphene oxide (rMGO) via microwave arcing