

Electrochemical Exfoliation of Layered Conductive Materials

Sheng Yang
Prof. Xinliang Feng

Department of Chemistry and Food Chemistry & Center for Advancing Electronics Dresden (afaed), Technische Universität Dresden, Germany

Sheng.yang1@mailbox.tu-dresden.de

Graphene and other two-dimensional (2D) materials have led to widespread enthusiasm both in academia and industry. Despite the advantages of these exciting materials have been illustrated everywhere, they have not yet found their way into everyday life products. The major hurdles stand in the reproducible bulk production of high-quality 2D flakes at low cost. Recent discovery reveals that when the layered counterparts are used as working electrode in an electrochemical cell, an electric current drives the migration of ions or charged molecules into the interlayers and pushes thin layers apart. Relying on the rational design of electrolytes and strategies, electrochemical exfoliation can be particularly facile yet efficient with many other advantages such as upscalability, solution processability and eco-friendliness. This talk will focus on our recent progress on the top-down exfoliation of graphite into high-quality, solution-processable graphene flakes on a large scale. Some examples for the application of our exfoliated materials will also be presented.

References

- [1] S. Yang et al., *Angew. Chem. Int. Ed*, 2017, in press
- [2] S. Yang et al., *Adv. Mater*, 2016, 28, 6213.
- [3] S. Yang et al., *J. Am. Chem. Soc*, 2015, 137, 13927.
- [4] K. Parvez et al., *J. Am. Chem. Soc*, 2014, 136, 6083

Figures

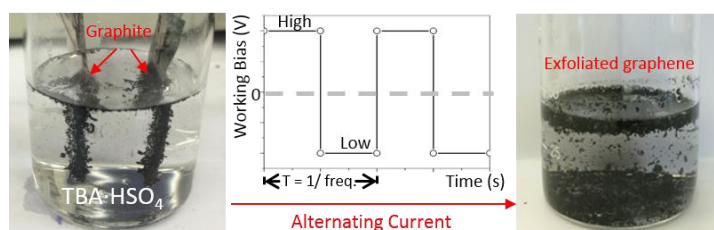


Figure 1. Ultrafast delamination of graphite into high-quality graphene using alternating currents

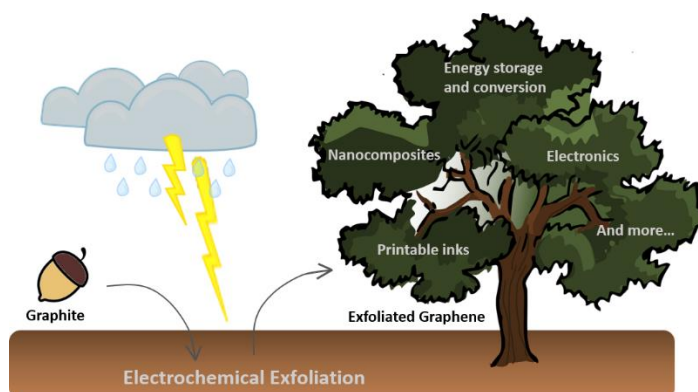


Figure 2. Exfoliation of graphite for a wide spectrum of applications