

Ultrafast and Green synthesis of graphene oxide by water electrolytic oxidation

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Graphene oxide (GO) is an important derivative of graphene, which is charming for its various applications based on the chemical and physical properties of GO. [1] However, the environmental pollution in the synthesis of GO is always a dark cloud in the sky of its industrialization. Graphene synthesized by electrochemical exfoliation of graphite has a long history, which has been accepted as an effective and environmental-friendly method for producing graphene [2]. However, the synthesis of GO by electrochemical route is still not so successful though many researchers have tried to realize it [3-4]. We will report a scalable, safe and green method to synthesize graphene oxide with a high yield based on water electrolytic oxidation of graphite. The graphite lattice is fully oxidized within a few seconds in our electrochemical oxidation reaction (Fig. 1), and the graphene oxide obtained is similar to those achieved by the present chemical oxidation methods (Fig. 2). We also discuss the synthesis mechanism and demonstrate continuous and controlled synthesis of graphene oxide and its applications [5].

References

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- [3] Tian, Z. et al., Carbon, (2017) 185
- [4] Parvez, K. et al., Chem. Comm., (2016) 5714
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Figures

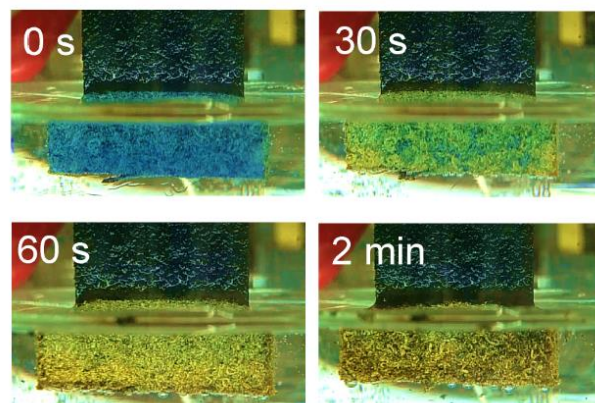


Figure 1: The change from intercalated graphite paper (blue) to graphene oxide (yellow).

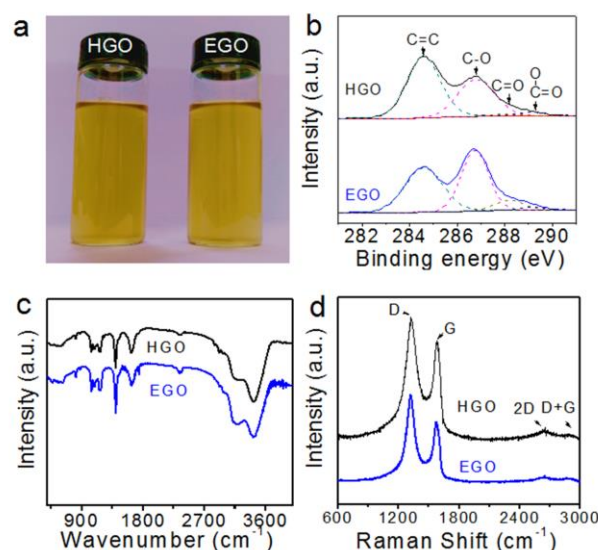


Figure 2: Comparison of GO synthesized by chemical oxidation (HGO) and electrochemical oxidation (EGO). **a.** photos of aqueous solution (1 mg·ml⁻¹), **b.** XPS C1s spectra, **c.** FTIR spectra, **d.** Raman spectra.