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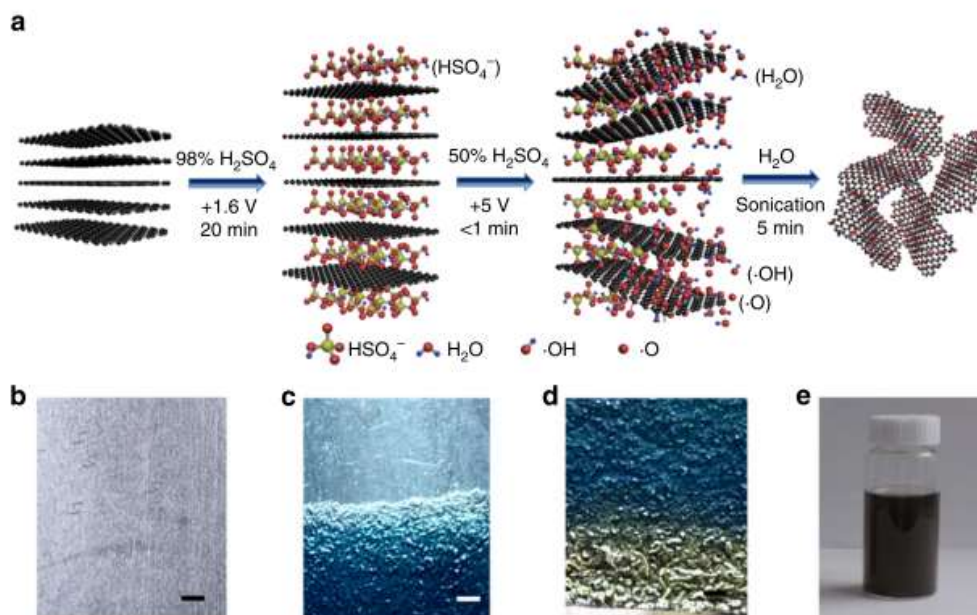
## **Green Controlled Synthesis of Graphene Oxide by Water Electrolytic Oxidation**

Graphene oxide (GO), as an important graphene derivative, has many unique properties and interesting applications based on the chemical and physical properties of GO.[1] GO sheets are usually synthesized by oxidizing graphite with mixtures containing strong oxidizing agents, acid solvent and other chemical reagent.[2] However, the chemical oxidation encounter problems such as a complex preparing process, a long reaction time, involving explosive chemicals and toxic gas, a large amount of heavy metal waste water, which are obstacle for industrial preparation of graphene oxide. The electrochemical exfoliation of graphene has attracted attention due to easy, fast and environmentally friendly nature for producing graphene.[3] However, the electrochemical route of the synthesis of GO is not obtained so successful. We report a scalable, safe, ultrafast and green electrochemical method to synthesize GO sheets, which involves electrochemical intercalation of graphite by sulfur acid and subsequent water electrolytic oxidation. The pre-intercalation of graphite efficiently inhibits oxygen evolution and consequently enables ultrafast water electrolytic oxidation of graphite within a few seconds and the graphene oxide prepared is similar to those achieved by the chemical oxidation methods. We also discuss the mechanism of controlled synthesis of graphene oxide and its application.[4] In addition, we will report a one-step electrolytic method for synthesis of graphene quantum dots with blue fluorescent characteristics in aqueous solution.

### **References**

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## Figures



**Figure 1:** Synthesis of EGO by water electrolytic oxidation. a, Schematic illustration of the synthesis process of EGO by water electrolytic oxidation. b–e, Photos of the raw material and the products obtained at each step. b, FGP. c, GICP (blue area) obtained after EC intercalation of FGP in 98 wt.%  $\text{H}_2\text{SO}_4$  at 1.6 V for 20 min. d, Graphite oxide (yellow area) obtained by water electrolytic oxidation of the GICP in 50 wt.%  $\text{H}_2\text{SO}_4$  at 5 V for 30 s. e, Well-dispersed EGO aqueous solution ( $5 \text{ mg}\cdot\text{mL}^{-1}$ ) obtained by sonication of the graphite oxide in water for 5 min. Scale bars in b-d: 1mm