

Electronic Supplementary Information

Facile method for the environmentally friendly fabrication of reduced graphene oxide films assisted by a metal substrate and saline solution

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Experimental Procedures

GO was synthesized from natural graphite flakes (Graphite flakes, natural, 99.8%, purchased from Alfa Aesar) based on a modified Hummers method, as described previously.¹ The GO was dispersed in water and sonicated for 1 h at room temperature. A steel sheet was selected as the metal substrate in this experiment because steel sheets are readily oxidized in the presence of water or NaCl solutions. GO was deposited by electrophoretic deposition onto the steel sheet (cold rolled steel, purchased from POSCO), which acted as the anode. The cathode comprised a glassy carbon electrode. The two electrodes were positioned parallel in the GO suspension with a separation distance of 1 cm. The typical GO concentration was 1 mg/mL, and the applied direct current voltage was 10 V. The deposition time ranged from 10 s to 180 s and was used to control the GO film thickness. The wet EPD-GO film supported on steel sheet was dried overnight in ambient air to remove any residual water. The dried EPD-GO film mounted on the steel sheet was then exposed to a NaCl solution (5 wt% NaCl in deionized water) by spraying at 35°C for 1 h. The sheet was then rinsed thoroughly with deionized water. This film was dried for a few hours in ambient air. The NaCl solution-treated EPD-GO film mounted on a steel sheet was denoted an “EPD-rGO film”. EPD-GO or EPD-rGO films were transferred to adhesive tape in order to evaluate their various properties, such as electrical properties. We could peel off EPD-GO or EPD-rGO film by using adhesive tape and transfer EPD-GO or EPD-rGO films from steel sheet to adhesive tape at once.

Reference

1. O. C. Compton, B. Jain, D. A. Dikin, A. Abouimrane, K. Amine and S. T. Nguyen, *ACS Nano*, 2011, 5, 4380-4391.

Figures

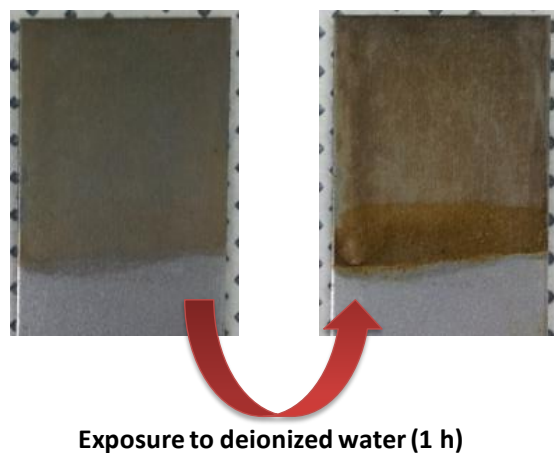


Figure S1. Photographs before and after exposure of the EPD-GO film supported on a steel sheet to deionized water for 1 h.

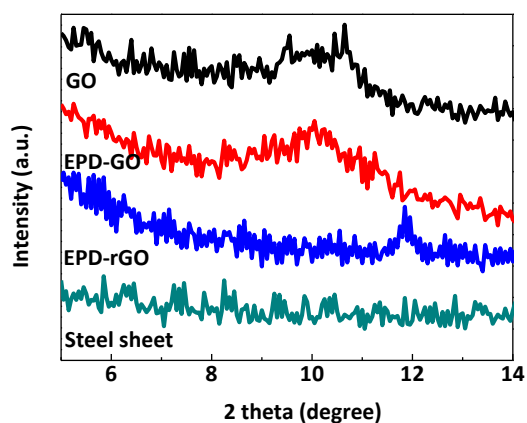


Figure S2. Theta-2 theta mode out-of-plane XRD patterns for the GO, EPD-GO film, EPD-rGO film, and steel sheet.

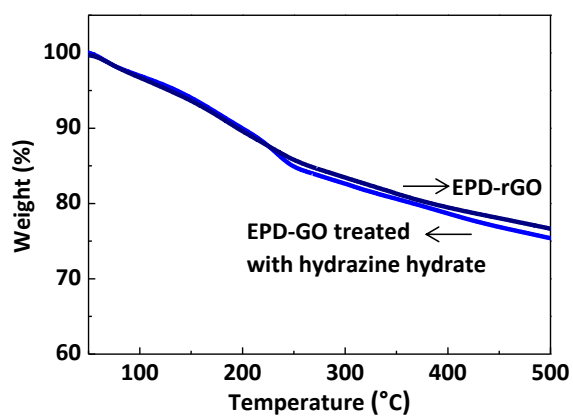


Figure S3. Normalized TGA plots for the EPD-rGO film and the EPD-GO film treated with hydrazine hydrate.