

Supporting Information

Oil Absorbing Graphene Capsules by Capillary Molding

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Experimental details

Synthesis of r-GO capsules: GO was prepared by a modified Hummers' method¹ as reported elsewhere.² Polystyrene bead colloids were prepared by emulsion polymerization.³ Typically 50 ml of aqueous dispersion containing 25 mg GO, 3 ml polystyrene colloids from the stock solution and a second component was prepared for nebulization by an ultrasonic atomizer (1.7 MHz, UN-511, Alfesa Pharm Co., Japan) to form aerosol droplets, which were carried by Ar gas at 1 L/min into a horizontal tubular furnace pre-heated at 600 °C (tube diameter is 1 inch). A Teflon filter was placed at the exhaust to collect the r-GO capsule powders. For dye adsorption and oil absorption experiments, two commercial carbons were used as control samples: Activated carbon (Norit Darco[®] G60) and carbon black particles (Cabot Vulcan[®] XC72).

Characterization: Electron microscopy observation was carried out using a FEI NOVA 600 SEM and a Hitachi H-8100 TEM. The specific surface areas were measured using the Brumauer_Emmett_Teller (BET) method based on the nitrogen adsorption-desorption isotherms measured at 77 K on a Quadrasorb analyzer (Quantachrome).

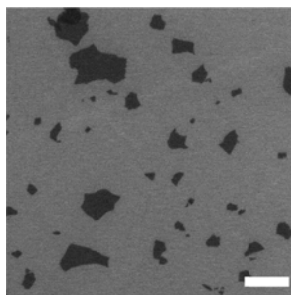


Figure S1. SEM image showing the size distribution of GO sheets after being sonicated for 2 hours in the nebulizer. Scale bar = 6 μm .

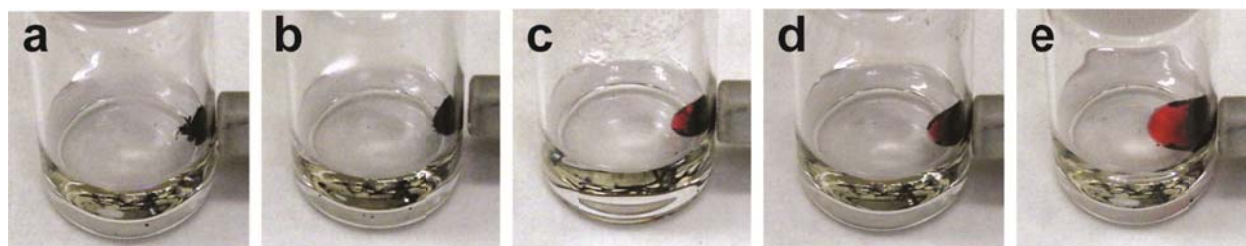


Figure S2. Method of determining the oil absorption capability of Fe_3O_4 decorated magnetic r-GO hollow capsules. Incremental amounts of vegetable oil (colored with a red dye) are mixed with 1 mg of carbon powder for overnight. Then water is added to float the oil/carbon blend, and a magnet is used to drag the oil. If red oil can be seen (c, d, e), it implies that the maximal absorption capability has been reached. In (a-e), the volume of oil is 10, 17.5, 21, 25 and 50 μl , respectively. In this particular example, the maximum absorption capability of Fe_3O_4 decorated graphene hollow capsules is between 17.5 and 21.0 $\mu\text{l}/\text{mg}$ or 15.8~19.6g of oil for each gram of capsules (density of oil=0.903 g/cm^3), which is comparable to that reported for r-GO foams⁴.

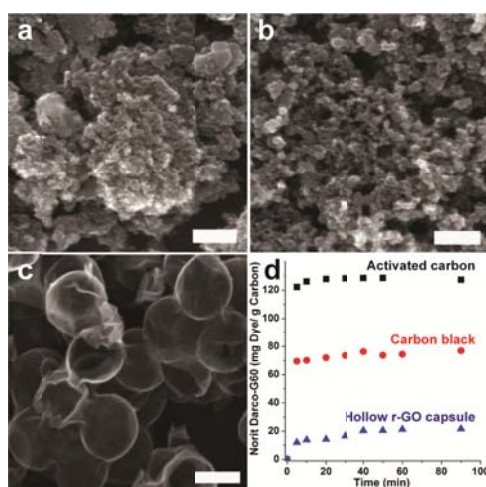


Figure S3. (a-c) SEM images showing the microstructures of (a) activated carbon particles, (b) carbon black particles, (c) r-GO hollow capsules, respectively. (d) Methylene blue dye adsorption capability of each carbon material in aqueous solution. Scale bars: (a-c) 100 nm.

Reference

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- 3 D. Zou, V. Derlich, K. Gandhi, M. Park, L. Sun, D. Kriz, Y. D. Lee, G. Kim, J. J. Aklonis, and R. Salovey, *J. Polym. Sci., Part A: Polym. Chem.* **1990**, *28*, 1909.
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