Supporting Information
Oil Absorbing Graphene Capsules by Capillary Molding

Kwonnam Sohn,\textsuperscript{a} Yoon Joo Na,\textsuperscript{a} Hankwon Chang,\textsuperscript{b} Ki-Min Roh,\textsuperscript{b} Hee Dong Jang,\textsuperscript{*b} and Jiaxing Huang\textsuperscript{a}

\textsuperscript{a} Department of Materials Science and Engineering, Northwestern University, 2220 Campus Drive, Evanston, IL, 60208, USA
\textsuperscript{b} Rare Metals Research Center, Korea Institute of Geoscience and Mineral Resources, Yuseong-gu, Daejeon 305-350, Korea
E-mail: jiaxing-huang@northwestern.edu (J.H); hdjang@kigam.re.kr (H.D.J)

Experimental details

\textit{Synthesis of r-GO capsules:} GO was prepared by a modified Hummers' method\textsuperscript{1} as reported elsewhere.\textsuperscript{2} Polystyrene bead colloids were prepared by emulsion polymerization.\textsuperscript{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, Alfa Chemistry 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).

\textit{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).

\textbf{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 Fe₃O₄ 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-c), the volume of oil is 10, 17.5, 21, 25 and 50 µl, respectively. In this particular example, the maximum absorption capability of Fe₃O₄ decorated graphene hollow capsules is between 17.5 and 21.0 µl/mg or 15.8~19.6g of oil for each gram of capsules (density of oil=0.903 g/cm³), which is comparable to that reported for r-GO foams.

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