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## Graphene Oxide as Support for Layered Double Hydroxides: Enhancing the CO<sub>2</sub> Adsorption Capacity

**By:** Garcia-Gallastegui, A (Garcia-Gallastegui, Ainara)<sup>[1,3]</sup>; Iruretagoyena, D (Iruretagoyena, Diana)<sup>[2]</sup>; Gouvea, V (Gouvea, Veronica)<sup>[1]</sup>; Mokhtar, M (Mokhtar, Mohamed)<sup>[4]</sup>; Asiri, AM (Asiri, Abdullah M.)<sup>[4]</sup>; Basahel, SN (Basahel, Sulaiman N.)<sup>[4]</sup>; Al-Thabaiti, SA (Al-Thabaiti, Shaeel A.)<sup>[4]</sup>; Alyoubi, AO (Alyoubi, Abdulrahman O.)<sup>[4]</sup>; Chadwick, D (Chadwick, David)<sup>[2]</sup>; Shaffer, MSP (Shaffer, Milo S. P.)<sup>[1]</sup>

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### CHEMISTRY OF MATERIALS

**Volume:** 24 **Issue:** 23 **Pages:** 4531-4539

**DOI:** 10.1021/cm3018264

**Published:** DEC 11 2012

[View Journal Impact](#)

### Abstract

Layered double hydroxides (LDHs) show great potential as CO<sub>2</sub> adsorbent materials, but require improvements in stability and CO<sub>2</sub> adsorption capacity for commercial applications. In the current study, graphene oxide provides a light-weight, charge-complementary, two-dimensional (2D) material that interacts effectively with the 2D LDHs, in turn enhancing the CO<sub>2</sub> uptake capacity and multicycle stability of the assembly. As a result, the absolute capacity of the LDH was increased by 62% using only 7 wt % graphene oxide (GO) as a support. The experimental procedure for the synthesis of the materials is based on a direct precipitation of the LDH nanoparticles onto GO followed by a structural and physical characterization by electron microscopy, X-ray diffraction, thermogravimetric analysis, and Brunauer-Emmett-Teller (BET) surface area measurements. Detailed titration confirmed the compatibility of the surface chemistry. After thermal decomposition, mixed metal oxides (MMOs) are obtained with the basic sites required for the CO<sub>2</sub> adsorption. A range of samples with different proportions of GO/MMO were prepared, fully characterized, and correlated with the CO<sub>2</sub> sorption capacity, established via TGA.

### Keywords

**Author Keywords:** graphene oxide (GO); graphene; layered double hydroxide(s) (LDHs); hydrotalcite(s); CO<sub>2</sub> sorption; CO<sub>2</sub> capture and storage (CCS)

**KeyWords Plus:** WALLED CARBON NANOTUBES; HYDROTALCITE-LIKE COMPOUNDS; HIGH-TEMPERATURE; CAPTURE; HYBRID; COMPOSITES; WATER; SUPERCAPACITORS; NANOCOMPOSITES; PERFORMANCE

### Author Information

**Reprint Address:** Garcia-Gallastegui, A (reprint author)

Univ London Imperial Coll Sci Technol & Med, Dept Chem, S Kensington Campus, London SW7 2AZ, England.

#### Addresses:

[ 1 ] Univ London Imperial Coll Sci Technol & Med, Dept Chem, London SW7 2AZ, England

[ 2 ] Univ London Imperial Coll Sci Technol & Med, Dept Chem Engr, London SW7 2AZ, England

[ 3 ] Bio Nano Consulting, London NW1 3BT, England

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**Organization-Enhanced Name(s)**

King Abdulaziz University

**E-mail Addresses:** [ainara.garcia@bio-nano-consulting.com](mailto:ainara.garcia@bio-nano-consulting.com); [m.shaffer@imperial.ac.uk](mailto:m.shaffer@imperial.ac.uk)

**Funding**

| Funding Agency            | Grant Number |
|---------------------------|--------------|
| King Abdulaziz University | T/81/429     |
| CONACYT                   |              |
| SEP                       |              |

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**Publisher**

AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036 USA

**Categories / Classification**

**Research Areas:** Chemistry; Materials Science

**Web of Science Categories:** Chemistry, Physical; Materials Science, Multidisciplinary

**Document Information**

**Document Type:** Article

**Language:** English

**Accession Number:** WOS:000312122400006

**ISSN:** 0897-4756

**eISSN:** 1520-5002

**Other Information**

**IDS Number:** 051JL

**Cited References in Web of Science Core Collection:** **41**

**Times Cited in Web of Science Core Collection:** **67**