

Lithium storage mechanism of reduced graphene oxides
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Reduced graphene oxides have been prepared via controllably thermal and chemical reduction processes. The structure, surface chemistry and electrochemical behaviors of reduced graphene oxides are investigated by Raman spectroscopy, N_2 adsorption, temperature-programmed desorption, FT-IR, XPS, as well as charge/discharge measurements. Fig. 1 (a) shows the charge/discharge curves of the first cycle and fig. 1 (b) displays the first corresponding differential de-lithiation curves of thermally and chemically reduced graphene oxides. Fig. 2 demonstrates the FT-IR spectra of as-prepared GO and thermally and chemically reduced graphene oxides. Fig. 3 (a) and 3 (b) give the information of XPS spectra of different thermally and chemically reduced graphene oxides: (a) C 1s spectra and (b) O 1s spectra. The enhanced reversible capacity of reduced graphene oxides is attributed to specific functionalities rather than to exceptional large specific surface area or structure defect. The contributed capacities at potential higher than 1.5 V and in region of 0.8 to 1.5 V are attributed dominantly to phenol groups and cyclic edge ether groups, respectively. These findings may be beneficial to the material design of graphene-based anode materials with high energy density [1].

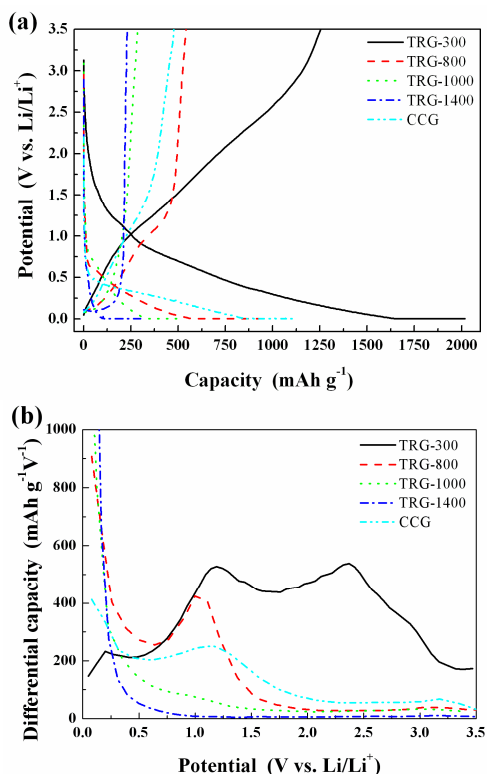


Fig. 1. (a) The charge/discharge curves of the first cycle and (b) the first corresponding differential de-lithiation curves of thermally and chemically reduced graphene oxides.

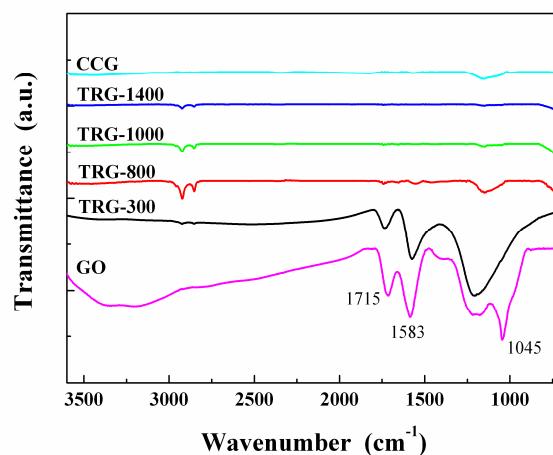


Fig. 2. FT-IR spectra of as-prepared GO and thermally and chemically reduced graphene oxides.

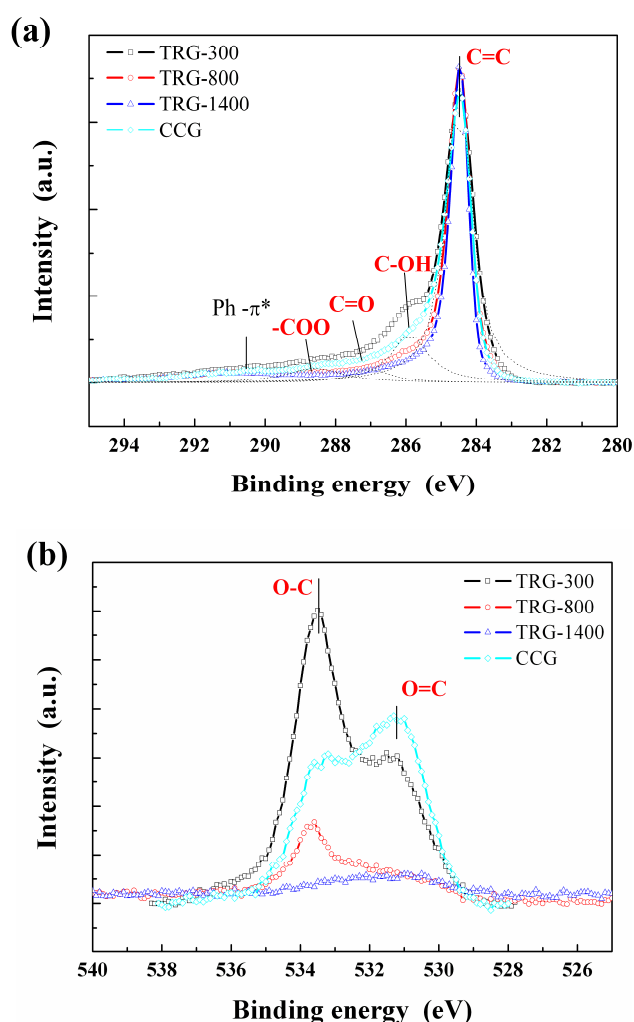


Fig. 3. XPS spectra of different thermally and chemically reduced graphene oxides: (a) C 1s spectra and (b) O 1s spectra.

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Reference

[1] Shin-Liang Kuo, Wei-Ren Liu, Chia-Pang Kuo, Nae-Lih Wu, and Hung-Chun Wu, *J. Power Sources* (2013) *in press*.