

Immobilization of Hydroxy-Dibenzo-14-Crown-4 Ether onto Multi-walled Carbon Nanotubes and its application for Li⁺ Recovery in dilute solutions

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Multi-walled carbon nanotubes (MWCNT)-based lithium adsorbent is presented. Hydroxy-dibenzo-14-crown-4 ether (HDB14C4) was effectively immobilized on MWCNTs after oxidation, epoxidation, epoxide ring cleavage and etherification. MWCNT oxidation increased the needed surface functionalities whereas epoxidation and its ring opening were convenient for HDB14C4 attachment. The latter step provided free hydroxyl groups, which were converted as proton ionizable carboxylic groups. The carboxyl moiety was incorporated to enhance Li⁺ uptake. Characterizations were performed through titration, gravimetry, FTIR, TGA, Raman and TEM. Apart from good optical properties, the adsorbents demonstrated enhanced metal ion adsorption and high Li⁺ affinity in the presence of competing cations at high pH. This work was funded by the Ministry of Science, ICT & Future Planning (No. 2012R1A2A1A01009683) and Education (No. 2009-0093816).