

Synthesis of Crown Ether-Decorated Phosphazene-Modified Magnetic Graphene Oxide as a Composite Adsorbent Material for Selective Lithium Ion Recovery from Seawater

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A multi-functional composite adsorbent was successfully synthesized and was used as lithium ion (Li^+) adsorbent. The adsorbent utilized 12-crown-4-ether (CE) as Li^+ -selective ionophore, phosphonitricchloride trimer (HCTP) to increase the CE attachment sites, graphene oxide (GO) as a two-dimensional high aspect ratio support material, and magnetite (Fe_3O_4) as support for easy material recovery. The Li^+ adsorption performance of the adsorbent was systematically studied, and it has high selectivity towards Li^+ as compared to other cations present in seawater, such as Na^+ , K^+ , Mg^{2+} , and Ca^{2+} . It can be easily separated via external magnet and re-used. Overall results demonstrate the high adsorption capacity and suitability of CE-HCTP-rGO- Fe_3O_4 for long-term adsorption applications. This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No. 2018R1D1A1B07048007 and No. 22A20130012051(BK21Plus)).