

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 composite multi-functional adsorbent was successfully synthesized and was used as lithium ion (Li^+) adsorbent from seawater. 12-crown-4 ether (CE) as Li^+ -selective ionophore, phosphonitrilic chloride trimer (HCTP) as multiple 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 compose the adsorbent denoted as CE-HCTP-rGO- Fe_3O_4 . The adsorbent is highly selective 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 (2018R1D1A1B07048007, 22A20130012051(BK21Plus) and 2009-0093816) and by the Ministry of Science and ICT (No. 2017R1A2B2002109)