

Crown Ether-Decorated Magnetic Reduced Graphene Oxide as a Composite Adsorbent for Lithium Ion Recovery from Seawater

Khino Parohinog, Grace Nisola, Chosel P. Lawagon, Lawrence A. Limjuco, Anelyn Bendoy,

Jed Albarico, Hana Gebre, Hilof Tekle, 정옥진[†]

Energy and Environment Fusion Technology Center (E2FTC), Department of Energy Science and Technology (DEST),

명지대학교

(wjc0828@gmail.com[†])

A multi-functional composite adsorbent (CE-rGO-Fe₃O₄) was successfully synthesized for selective Lithium ion (Li⁺) adsorption. The adsorbent is composed of a Crown Ether (CE) as Li⁺-specific ionophore, magnetite (Fe₃O₄) for material recovery and recyclability, and Reduced Graphene Oxide (rGO) as a two-dimensional, high aspect ratio support for CE and Fe₃O₄. The adsorption experiment at varied Li⁺ concentrations revealed the Langmuir-type Li⁺ uptake. The adsorbent is highly selective towards Li⁺ as compared to other cations present in seawater, such as Na⁺, K⁺, Mg²⁺, and Ca²⁺. It can be easily separated via external magnet and re-used. Overall results demonstrate the suitability of CE-GO-Fe₃O₄ for long-term Li⁺ adsorption application. This research was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Science, ICT and Future Planning (2015R1A2A1A15055407) and by the Ministry of Education (No. 2009-0093816).