Equilibrium, kinetics, and thermodynamics of Li^+ adsorption by H_2TiO_3 in diluted aqueous lithium resources

LAWAGON CHOSEL, Grace M. Nisola,
Lawrence A. Limjuco, Eleazer L. Vivas, 이성풍, 서정길,
정욱진†
Department of Energy Science and Technology (DEST), Energy and Environment Fusion Technology Center (E2FTC), Myongji University
(wjc0828@gmail.com†)

H_2TiO_3 adsorbent was prepared by acid delithiation of Li_2TiO_3 precursor. It was investigated for its lithium (Li^+) uptake in aqueous solution and in seawater. The adsorption capacity was ~33.75 mg g−1 at solid to liquid (S/L) ratio of 0.2 to 0.4. Li^+ uptake is directly and inversely proportional to the initial pH and S/L ratio, respectively. The adsorption process follows pseudo-second order equation and isotherm fits well the Langmuir equation. It was shown to be spontaneous and endothermic in nature. The H_2TiO_3 can efficiently and selectively adsorb Li^+ from seawater and can be used for five cycles while maintaining its initial adsorption capacity (~33.6 mg/g). Overall, the prepared adsorbent was proven to be a recyclable and efficient ion-sieve for the recovery of Li^+. This work was supported by the Basic Science Research Program through the National Research Foundation of Korea (NRF) grant funded by the Ministry of Education (No. 2009-0093816).