Development of high capacity Li^+ adsorbents from H_2TiO_3/polymer nanofiber composites: Systematic polymer screening, characterization and evaluation

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Various polymers were systematically screened as matrix for H_2TiO_3 as Li^+ adsorbent. H_2TiO_3/polymers were electrospun as nanofiber (NF) composites, characterized, and evaluated via response surface methodology with central composite design of Li^+ adsorption experiments. Results identified polyacrylonitrile (PAN) as the most suitable H_2TiO_3 support. Its favorable NF structure and hydrophilicity provided sufficient H_2TiO_3/PAN–feed interaction, which minimized losses in Li^+ adsorption rate and capacity (q) relative to H_2TiO_3. Li^+ adsorption in H_2TiO_3/PAN is Langmuir–type (qmaximum = 72.75 mg g−1), highly selective, and thermodynamically favorable. Stable performance and durability during cycled adsorption/desorption run prove H_2TiO_3/PAN NF as a highly effective composite Li^+ adsorbent. This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education(2018R1D1A1B07048007 and 2009-0093816) and by the Ministry of Science and ICT (No. 2017R1A2B2002109).