

Lithium Isotope Effect Accompanying Electrochemical Intercalation of Lithium into Graphite

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Lithium has been electrochemically intercalated from a 1:2 (v/v) mixed solution of ethylene carbonate (EC) and methylethyl carbonate (MEC) containing 1 M LiClO_4 into graphite, and the lithium isotope fractionation accompanying the intercalation was observed. The lighter isotope was preferentially fractionated into graphite. The single-stage lithium isotope separation factor ranged from 1.007 to 1.025 at 25 °C and depended little on the mole ratio of lithium to carbon of the lithium-graphite intercalation compounds (Li-GIC) formed. The separation factor increased with the relative content of lithium. This dependence seems consistent with the existence of an equilibrium isotope effect between the solvated lithium ion in the EC/MEC electrolyte solution and the lithium in graphite, and with the formation of a solid electrolyte interfaces on graphite at the early stage of intercalation.

Key words: Lithium Isotopes; Isotope Effects; Electrochemical Intercalation, Single-stage Separation Factor; Lithium-graphite Intercalation Compounds.