Ethylene Glycol Bis(Propionitrile) Ether as an Additive for SEI Film Formation in Lithium-Ion Batteries

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The effect of ethylene glycol bis(propionitrile) ether(DENE) as a novel electrolyte additive on the electrochemical performance of a graphite anode was studied in this paper. Fourier transform infrared spectroscopy(FTIR), charge/discharge tests, cyclic voltammetry(CV), X-ray photoelectron spectroscopy(XPS), scanning electron microscopy(SEM), and electrochemical impedance spectroscopy(EIS) were used to investigate the SEI film and the cycle performance of graphite anode. The initial charge capacities of the graphite electrode in the electrolytes without and with 1% DENE were 319 mAhg⁻¹ and 349 mAhg⁻¹, respectively. After 60 cycles, the charge capacities without and with 1% DENE were 315 mAhg⁻¹ and 350 mAhg⁻¹, respectively. and the capacity retention rates were 95.8% and 98.1%, respectively. DENE promoted the formation of a thin and uniform SEI layer and improved the stability of the electrode. The addition of DENE effectively improved the electrochemical performance of graphite anodes.

Keywords: lithium-ion batteries; additive; Ethylene glycol bis(propionitrile) ether; solid electrolyte interface (SEI) film

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