Lithium deposition control with electric field in lithium ion battery

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ABSTRACT

As interests to electric vehicles (EV) and energy storage systems (ESS) have been increased, numerous studies are performed to improve cycle life and stability of batteries. Among them, lithium metal is one of the most promising candidates for anode material because of its high theoretical specific capacity (3860 mAh/g) and low density (0.53 g/cm³). But, the dendritic growth of lithium metal during charge/discharge system result in low stability and poor cycle life of secondary battery. In our previous research, it is verified that the movement of lithium ions can be controlled by outer DC electric field. In this study, influence of outer AC electric field to movement of lithium ion is analyzed. When electrical potential is applied to lithium symmetric cell in perpendicularly, it forms electric field. At the same time, the movement of lithium ions shifting to counter electrode are influenced by electric field. Through this analysis, lithium deposition is controlled and it lead the suppression of dendritic growth.

Keywords: Dendrite, Electrical potential, Energy material, Ion deposition, Ion flux