

Surface-Protecting Effect of Magnesium Perchlorate in Lithium Metal Batteries

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Due to its extremely high capacity(3860 mAh/g) and low redox potential, lithium metal is the most promising candidates as anode material for next-generation batteries. However, there are two well-known failure mechanisms in lithium metal batteries. One is the growth of sharp dendrite, which can lead to short and safety issue. Second is poor cycling performance due to consumption of electrolyte and formation of dead lithium. Several approaches such as surface coating, making 3D structure or adding additives have been conducted. Among those, additive approach was selected as a simple and effective method. We tested 6 additives and magnesium perchlorate was revealed to show best performance. Here, we investigated the effect of magnesium perchlorate additive and how it stabilizes the electrode surface. The magnesium perchlorate added cell retains Coulombic efficiency of 90% at 160 hour with 1.0 M LiPF₆ in EC/DEC (1:1 vol. %) electrolyte, while reference cell only exhibits Coulombic efficiency of 75%. Also, it retains small overpotential of 0.05 V after 160 hour.