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Design, fabrication and nano-scale characterization of novel SEI layers

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Lithium has a high specific capacity of 3860 mAh g−1 and a low electrochemical potential (-3.04 V), promising a high energy density lithium metal battery (LMB). However, the growth of lithium dendrites during charging and discharging would penetrate the separators in LMBs, which leads to short circuit. To inhibit the growth of lithium dendrites, we focus on optimizing the SEI layer through localized iodination for an interface and ion modulation. In the standard electrolyte (propylene carbonate/fluoroethylene carbonate/dimethyl carbonate=7.5/2/0.5 v/v/v, 1.05 M lithium bis(trifluoromethanesulfonyl)imide), a small amount of additive (poly (N-vinylimidazole) quaternized with iodide, molecular weight 16500 g/mol, 21% quaternization, abbreviated as PVIM) is added. We probe the electrochemical performance and morphology via Galvanostatic tests and scanning electron microscopy. Compared the control sample, Li-Li symmetrical cells with the PVIM additive electrolyte display a better electrochemical performance with smoother surface of lithium metal.

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