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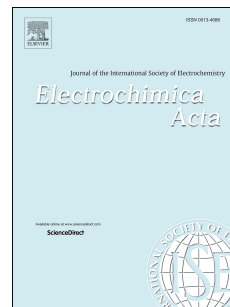
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Oriented growth of Li metal for stable Li/carbon composite negative electrode

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Abstract

Lithium metal has been considered as an ideal negative electrode for lithium batteries, but its practical use is impeded by the inferior cycling performance and the potential safety issues caused by Li dendrite formation. Herein, we use thermal evaporation to deposit one side of the carbon cloth with 20 nm thick Ag. The two surfaces with different lithiophilic characteristics as a result of Ag deposition lead to oriented growth of Li metal during Li plating. By manipulating the growth direction of Li metal away from the separator, we can eliminate the possibility of shorting caused by separation penetration. Moreover, the Li metal on the Ag layer shows a nodule-like morphology instead of the conventional needle-like dendrite morphology. The nodule-like Li possesses excellent electrochemical reversibility and the Li/carbon cloth-Ag composite negative electrode shows an excellent Coulombic Efficiency over 97% with the specific capacity as high as the 5 mAh cm⁻² after 50 cycles.

Key words: Lithium metal; oriented growth; silver; carbon cloth; negative electrode

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