The electrodeposited lithium anode for lithium-metal battery application

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Lithium metal is a promising anode candidate for next-generation lithium batteries. However, lithium metal batteries have some limitations such as safety problems including uncontrolled growth of lithium dendrites, and volume expansion which are caused by the high reactivity of lithium metal. In this study, we have fabricated a uniform lithium metal anode using electrodeposition method in order to improve the cell performance by supressing the growth of the dendrite. We have deposited a dense lithium layer as anode on copper substrates. Compared with constant current plating technique, pulse plating waveform technqiue with short and widely spaced pulses offers improved lithium deposition morphology and cycling efficiency. Also, a lithium anode is fabricated using a 3D Cu mesh as a current collector and compared its performance with a conventional planar 2D Cu foil. The change in the morphology of the anode from 2D to 3D provides many advantages in suppressing lithium dendrite growth. The 3D Cu collector provides more specific surface area than the planar Cu collector which actually reduces the local current density effectively resulting the suppression of dendrite growth.