

Characterization and Electrochemical Performance of Copper-antimony Based Alloy Composites for Lithium ion Storage

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Cu-Sb-Al₂O₃@C composite as an anode for lithium ion batteries has been prepared via high energy mechanical milling, where Cu-Sb active materials are dispersed in an inactive hybrid matrix comprised of Al₂O₃ and carbon. This matrix can accommodate large volume changes during cycling, resulting in good electrochemical performance. However, it reveals very large initial irreversible loss. The irreversible loss is caused by SEI formation, defect-site trapping of Li ions, and Li₂O formation from surface oxides and unreacted precursors (Sb₂O₃). The introduction of an 8 hour heating step facilitates complete reduction of Sb₂O₃ and results in a drastic decrease in first cycle irreversibility with little effect on reversible capacity or cyclability.

Keywords: lithium-ion batteries, copper-antimony alloys, hybrid matrix, composite anode