Nanostructured $Cu_xSn_yO_z$ composites by galvanic replacement control as high-performance anode for Lithium-ion batteries

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Tin (Sn) has been considered as a promising anode material for lithium-ion batteries (LIBs) due to its high theoretical capacity (993 $mAhg^{-1}$). However, (de)alloying reaction with Sn causes a large volume change (~400 %), which can causes the unstable solid electrolyte interphase (SEI) films on their surface, causes pulverization of Sn anode and loss of contact with the current collector, resulting in poor electrochemical performance. It is necessary to seek appropriate approaches to overcome the difficulties. Several strategies, including nanostructure designing, modifying with carbon materials, and preparing Sn alloys, have been proposed to reduce the drastic volume changes, resulting in extended cyclic life of Sn material. In this presentation, the new nanostructured $Cu_xSn_yO_z$ composites, which contain alloys of copper (Cu) and Sn, have been fabricated by galvanic replacement reaction. When evaluated as potential anode materials for LIBs, they displayed high capacity, improved cycling performance, enhanced rate capabilities, high coulombic efficiency, and excellent cycling stability.