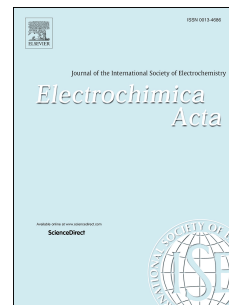


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# **Systematic Post-synthetic Modification of Metal-Organic Framework (ZIF-67) with Superior Cyclability for Lithium-ion Batteries**

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## **Abstract**

In this work, carboxyl groups were introduced on the organic ligands of ZIF-67 through post-synthetic modification ( $-\text{CH}_3 \rightarrow -\text{CH}_2\text{Br} \rightarrow -\text{CHO} \rightarrow -\text{COOH}$ ). A thin layer of Ag nanoparticles (3 nm in diameter) coating was deposited on external surface of ZIF-67 crystals through the reaction between the aldehyde groups in the ligands and silver ammonia solution. The carboxyl groups can participate in the lithium storage while the Ag nanoparticles coating help in increasing the conductivity. Electrochemical properties of the modified ZIF-67 electrodes are examined by cyclic voltammetry and galvanostatic charge/discharge tests. Benefiting from the outstanding conductivity of Ag nanoparticles and the synergistic effect between Ag nanoparticles and the modified ZIF-67, the composite exhibits enhanced electrochemical performance compared to its ZIF-67 counterpart. Nearly an invariable capacity of  $800 \text{ mA h g}^{-1}$  is maintained up to 100 cycles at  $0.28 \text{ C}$  ( $1\text{C}=137 \text{ mA g}^{-1}$ ) with a Coulombic efficiency of 99%. Furthermore, the ex situ X-ray diffraction and X-ray photoelectron spectroscopy studies on the electrode material under different

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