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直接和间接电合成制备出的高铁酸钾的物理和电化学性能

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摘要 K2FeO4 powders were synthesized by the ex-situ and in-situ electrochemical methods, respectively, and characterized by infrared spectrum (IR), scanning electron microscopy (SEM), X-ray powder diffraction (XRD) and BET. Their electrochemical performances were investigated by means of galvanostatic discharge and electrochemical impedance spectroscopy (EIS). The results of physical characterization showed that the two samples have similar structural features, but their surface morphologies and oriented growth of the crystals are different, which results in smaller specific surface area and lower solubility of the ex-situ electrosynthesized K2FeO4 sample. The results of discharge experiments indicated that the ex-situ electrosythesized K2FeO4 electrode has much larger discharge capacity and lower electrode polarization than the in-situ electrosynthesized K2FeO4 electrode. It was found from the results of EIS that lower electrochemical polarization might be responsible for the improvement on the discharge performance of the ex-situ electrosynthesized K2FeO4 electrode.

关键词 K2FeO4 electrosynthesis discharge performance electrochemical impedance spectroscopy (EIS)

分类号

Physical properties and electrochemical performance of solid K2FeO4 samples prepared by ex-situ and in-situ electrochemical methods

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Abstract

K2FeO4 powders were synthesized by the ex-situ and in-situ electrochemical methods, respectively, and characterized by infrared spectrum (IR), scanning electron microscopy (SEM), X-ray powder diffraction (XRD) and BET. Their electrochemical performances were investigated by means of galvanostatic discharge and electrochemical impedance spectroscopy (EIS). The results of physical characterization showed that the two samples have similar structural features, but their surface morphologies and oriented growth of the crystals are different, which results in smaller specific surface area and lower solubility of the ex-situ electrosynthesized K2FeO4 sample. The results of discharge experiments indicated that the ex-situ electrosythesized K2FeO4 electrode has much larger discharge ca-pacity and lower electrode polarization than the in-situ electrosynthesized K2FeO4 electrode. It was found from the results of EIS that lower electrochemical polarization might be responsible for the improvement on the discharge performance of the ex-situ electrosynthesized K2FeO4 electrode.

Key words K2FeO4 electrosynthesis discharge performance electrochemical impedance spectroscopy (EIS)

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