Short Communication

Preparation and Properties of the Fe/N co-doped Graphene Composite Materials

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The Fe doped and the Fe/N co-doped graphene composite materials were prepared from a graphene oxide dispersion by a hydrothermal method. Fe^{2+} was oxidized to be $\alpha\text{-Fe}_2\text{O}_3$, while graphene oxide was reduced to be reduced graphene oxide (rGO) during the hydrothermal reaction. For the Fe/N co-doped graphene composite material, nitrogen atoms were incorporated into the graphene structures in the form of C-N and C=N bonds. Both of the Fe doped and the Fe/N co-doped graphene composite materials exhibited a 3D hierarchical porous frame and a large surface area, which facilitated ion and electron transport. The results from electrochemical impedance spectroscopy (EIS) shows both of the charge transfer resistance and the diffusion resistance of the Fe/N co-doped material are smaller than that of the Fe doped material, which indicated that nitrogen played an important role in improving conductivity, the ion and electron transport kinetics and the redox reaction activity in the Fe/N co-doped graphene composites material.

Keywords: Reduced graphene oxide; Hydrothermal method; Doping; Iron oxide; EIS

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