

Performance of vanadium-doped LiFePO_4/C used as a cathode for a lithium ion battery

Nofrijon Sofyan, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20449317&lokasi=lokal>

Abstrak

Vanadium-doped LiFePO_4/C

used as a cathode for a lithium ion battery has been successfully synthesized.

In this work, LiFePO_4 was synthesized from LiOH , $\text{NH}_4\text{H}_2\text{PO}_4$,

and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ at a stoichiometric amount. Vanadium was added in the

form of $\text{H}_4\text{NO}_3\text{V}$ at concentration variations and 3 wt.%

carbon black. The characterization includes thermal analysis, X-ray

diffraction, electron microscopy, and electrical impedance spectroscopy. The

thermal analysis results showed that the LiFePO_4 formation

temperature is $653.8 \pm 700.0^\circ\text{C}$. The X-ray

diffraction results showed an olivine structure with an orthorhombic space

group, whereas the electron microscopy results showed that LiFePO_4/C

has a round shape with an agglomerated microstructure. Electrical impedance

test results showed values of 158 ± 937 ; and 59 ± 937 ; for the as-synthesized

LiFePO_4/C and the 5 wt.% vanadium-doped

LiFePO_4/C , respectively. Cyclic performance test results at 1 C

showed capacities of 24.0 mAh/g and 31.2 mAh/g for the as-synthesized LiFePO_4/C

and the 5 wt.% vanadium-doped LiFePO_4/C ,

respectively. Charge and discharge test results showed charge and discharge

capacities of 27.6 mAh/g and 40.2 mAh/g for the as-synthesized LiFePO_4/C and the 5 wt.%

vanadium-doped LiFePO_4 , respectively. This result is promising

in terms of increasing the performance of a lithium ion battery.