

The studies of lattice parameter and electrochemical behavior for $\text{Li}_3\text{V}_2(\text{PO}_4)_3/\text{C}$ cathode materials

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Single-phase, nano-sized $\text{Li}_3\text{V}_2(\text{PO}_4)_3/\text{C}$ materials with the monoclinic structure were prepared by a modified sol-gel method, in which the precursor materials were sintered at 750, 800, 850, and 900 °C, respectively. The X-ray diffraction (XRD) patterns of all the materials were consistent with the monoclinic structure without any impurities. The LVP/C composite sintered at 800 °C was selected as the most promising material on the basis of the lattice parameters ($a = 8.605 \text{ \AA}$, $b = 8.596 \text{ \AA}$, $c = 14.732 \text{ \AA}$, $\beta = 125.20^\circ$, $V = 890.59 \text{ \AA}^3$), crystallite size (99 nm), and morphology (5–6 nm carbon layer). The LVP/C composite sintered at 800 °C showed a high specific capacity with excellent kinetic properties (capacity of 130 and 170 $\text{mAh} \cdot \text{g}^{-1}$ at voltages of 3.0–4.3 and 4.8 V at 0.1 C, 25 °C), which showed about 98%, 86% of its theoretical capacity, respectively.

References:

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