

Structures and performances of vanadium substituted $\text{Li}_2\text{FeSiO}_4$ prepared by different vanadium sources

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A series of V-substituted $\text{Li}_2\text{FeSiO}_4$ were prepared through sol-gel process and solid state reaction by using either NH_4VO_3 or V_2O_3 as V sources. Effects of V substitutions on the structures and performances of $\text{Li}_2\text{FeSiO}_4$ were studied. The synthesized $\text{Li}_2\text{FeSiO}_4$ exhibited a good crystallinity with $P2_1/n$ structure, and nearly no impurities were detected. However, the V-substituted $\text{Li}_2\text{FeSiO}_4$ showed a similar $P2_1/n$ structure with the major impurities of Li_2SiO_3 and $\text{V}_3\text{O}_4/\text{Fe}_3\text{O}_4$. The discharge capacities of 160.9 mAh g^{-1} and 130.8 mAh g^{-1} were obtained for the $\text{Li}_2\text{FeSiO}_4$ and $\text{Li}_2\text{Fe}_{95}\text{V}_5\text{SiO}_4$, respectively, at C/16 and room temperature. The degree of graphitization in amorphous carbon was enhanced and the amounts of carbon coated were lowered with the increase of V substitutions. The presence of Li_2SiO_3 and $\text{V}_3\text{O}_4/\text{Fe}_3\text{O}_4$ impurities had a detrimental influence in the structure and performance of $\text{Li}_2\text{FeSiO}_4$.