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Synthesis and electrochemical performances of polyanionic compounds for Na-ion batteries anodes

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Polyanion compounds possess many advantages as Na-ion batteries anodes. For example, various crystal structures with open channels for Na-ions are available, and the polyanion compounds are believed to have high thermal stabilities due to strong covalent bonding of oxygen atom in the polyanion polyhedral. Furthermore, the reaction potentials of the compounds in the process of charging and discharging are influenced by the environment around the polyanion themselves, so we can adjust the structure of polyanion to change the reaction routes and improve the electrochemical performance. $Na_3V_2(PO_4)_3$ is a promising cathode material for Na-ion batteries due to the unique NASICON framework and excellent ionic conduction. On the other hand, the conductivity of $Na_3V_2(PO_4)_3$ is poor due to the presence of PO_4^{3-}, therefore many works were done to improve the electro chemical performance of materials through coating amorphous carbon layer on $Na_3V_2(PO_4)_3$ particles or synthesizing composite with conductive graphene and soon. This work aims to seek a simple and safe route to synthesis $Na_3V_2(PO_4)_3$/C composite and $NaVPO_4$ F/C composite by introducing the F^- and to investigate their electrochemical performances.

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