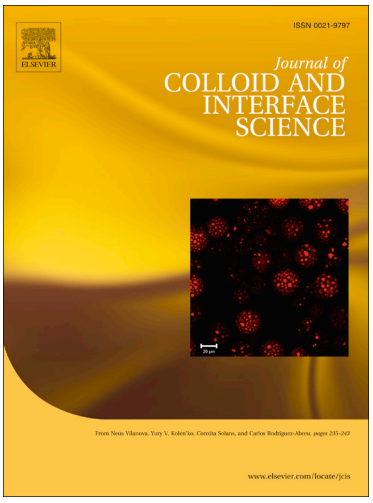

Cost-effective synthesis and superior electrochemical performance of sodium vanadium fluorophosphate nanoparticles encapsulated in conductive graphene network as high-voltage cathode for sodium-ion batteries

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Cost-effective synthesis and superior electrochemical performance of sodium vanadium fluorophosphate nanoparticles encapsulated in conductive graphene network as high-voltage cathode for sodium-ion batteries

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Abstract: Sodium vanadium fluorophosphate ($Na_3(VO)_2(PO_4)_2F$, denoted as NVPF) has attracted particular interests as cathode for high-energy sodium-ion batteries (SIBs) owing to the high working potential, high specific capacity, and robust structural framework. However, it is challenged by the low electron conductivity and lack of available facile synthesis method. Herein, an environmentally benign, cost-effective synthesis route is reported to produce NVPF nanoparticles encapsulated in conductive graphene network (NVPF/C), involving low-temperature synthesis of NVPF nanoparticles in absolute aqueous solvents and subsequent construction of conductive network through thermally induced transformation of graphene-oxide nanosheets. The resultant product is structurally and electrochemically investigated by combining X-ray diffraction, fourier transform infrared spectroscopy, scanning electron microscope, transition electron microscope, and electrochemical analysis. Experimental results show that the optimized NVPF/C product possesses a