

NITRATE COMBUSTION SYNTHESIS OF NVP CATHODE MATERIAL FOR NA-ION BATTERIES

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The synthesis and characterization of a $\text{Na}_3\text{V}_2(\text{PO}_4)_3$ cathode material for room-temperature sodium-ion battery is reported. The NVP material was prepared using a two-step process, which proceeded via sol-gel nitrate combustion method for precursor preparation and subsequent pyrolysis under Argon. Sodium-ion batteries have emerged as a promising candidate for large-scale energy storage due to sodium's abundance and low cost of raw materials. However, in order to justify lower energy densities compared to Li-ion systems, Co-containing cathodes have to be avoided.[1,2]

The electrode slurry was prepared by mixing the active material, conductive additive (Super P) and polyvinylidene difluoride (PVdF) binder in a 75:15:10 mass ratio. The mixed slurry was cast onto aluminium foil using doctor-blade technique. The cast electrodes were dried under vacuum for 24h. Electrochemical tests were carried out in coin cells, which were assembled in an Argon-filled glovebox ($\text{O}_2 < 0.1$ ppm, $\text{H}_2\text{O} < 0.1$ ppm). Sodium metal was used as the counter electrode and 1M NaPF_6 in EC:PC (1:1 vol) as the electrolyte in half-cell measurements.

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