

SYNTHESIS AND CHARACTERIZATIONS OF NaFePO₄/Na₂FePO₄F CATHODE MATERIALS FOR Na-ION BASED AQUEOUS BATTERY

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Introduction. Rechargeable Li-ion batteries have dominated the market for twenty years. However, the increasing demand for energy storage creates new challenges for further use of lithium-ion batteries mainly due to the problems associated with lithium sources and safety issues [1]. Na-ion based battery is an appealing alternative with comparable energy density to Li-ion based technologies [2]. Moreover, the fast ion intercalation/deintercalation in the aqueous electrolyte media could allow for the operations under high electric current conditions required especially for high power supply and eliminate safety issue [3].

Materials and methods. Olivine structured cathode materials for Na-ion aqueous batteries are synthesized using solid state, sol-gel and hydrothermal methods with different precursors. Synthesized materials are characterized by XRD, SEM, TEM, CHN and TGA. The electrochemical tests are carried out using galvanostat/ potentiostat testers (Arbin, USA) and two-electrode Swagelok-type cells.

Results and discussion. Olive structured NaFePO₄/Na₂FePO₄F cathode materials are successfully synthesized using different methods which have been confirmed via XRD. Homogeneous carbon coating on the surface of cathode materials are also detected which could enhance the conductivity of active materials thus improve the overall electrochemical performances. Further electrochemical characterizations will be presented in the poster session.

Conclusions. Rechargeable aqueous Na-ion based battery is expected to be a system of high safety, low cost, long cycling life, stable energy and power densities as a large scale energy storage device for renewable energy and electric vehicles applications.

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