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FABRICATION OF SODIUM-ION RECHARGEABLE BATTERY USING SODIUM COBALT PHOSPHATE CATHODE

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ABSTRACT

In recent years many researches were conducted to replace expensive Lithium- ion batteries with low cost alternatives. Sodium- ion batteries perform almost similar to Lithium- ion batteries which are less expensive. In this research a cathode material for Sodium- ion battery was fabricated using Cobalt (II) oxide and Sodium phosphate. Cobalt oxide and Sodium phosphate in 1:1 molar ratio was grinded well using mortar and pestle. The mixture was calcinated at 800 □C for an hour and then it was grinded again and calcinated at the same temperature for about half an hour. This process was carried out for three times. Powder X-Ray Diffraction (XRD) pattern confirmed the synthetization of Sodium cobalt phosphate through this process. Prepared sample was mixed with Polyvinylidene Fluoride (PVDF) and active Carbon at the ratio of 18:1:1 by mass respectively. This paste was applied on an Aluminum foil and dried on a hot plate at 100 □C. The battery was fabricated in a glove box filled with Argon gas. Sodium metal covered with a Copper plate was used as the anode. Cellulose separator in between the cathode and anode was soaked with 1 M Sodium perchlorate dissolved in Propylene carbonate. Prepared battery was tested for charge and discharge cycles with 0.5 mA current. Capacity of the battery was calculated as 9.58 mA h g^{-1}. Future work has to be directed to improve the cyclability and capacity of these batteries.

Keywords: Sodium- ion batteries, Cobalt oxide, XRD, Capacity, PVDF