OPTIMIZATION OF CARBON IN CATHODES MADE OF Na_2MnSiO_4 TO ENHANCE THE DISCHARGE CAPACITY OF SODIUM ION RECHARGEABLE BATTERY

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In this research we have synthesized Na_2MnSiO_4 by solid state reaction of Na_2CO_3, $MnCO_3$ and SiO_2 and fabricated a sodium ion rechargeable cell using this material in the cathode. The elemental analysis of the synthesized material was done using Energy Dispersive X-ray (EDX) spectroscopy. Since the material itself is an insulator, we have to optimize the carbon percentage in the cathode to obtain the best result in this investigation. Electrodes were prepared by using the active materials to which activated carbon was added varying the percentage from 5% to 20%, and 15% of Polyvinylidene Fluoride (PVDF) was added as the binder. The rechargeable battery was fabricated in an argon filled glove box using the cathode made of active material coated on an Al foil, and metallic sodium was used as the anode. The electrolyte was 1M $NaClO_4$ in propylene carbonate. The fabricated cell was galvanostatically charged and discharged to find out the specific charge capacity of the cell. According to the results, the highest specific discharge capacity of 8.16 mAh/g was attributed to the carbon percentage of 15%. Further investigations are being conducted to bring up the charge capacity of the cell to a practically viable limit.

Keywords: Galvanostatatically, Rechargeable batteries, Na_2MnSiO_4