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Synthesis and Electrochemical Characterization of Li_2FeSiO_4/Carbon Nanofiber Composite Cathode Material for Li Ion Batteries AJAY KUMAR, GHOLAM ABBAS NAZRI, Wayne State University, Detroit MI 48201, RATNA NAIK, Wayne State Univ, Detroit, MI 48201, VAMAN M NAIK, University of Michigan-Dearborn, Dearborn, MI 48128 — Lithium transition metal silicates (Li_2MSiO_4), where, M=Ni, Mn, Fe, and Co with a theoretical capacity of $\sim$ 330 mAh/g have attracted great interest as possible replacements for cathode material in rechargeable batteries. However, this class of materials exhibit very low electronic conductivity and low lithium diffusivity. In order to enhance the electronic conductivity and reduce the diffusion length for lithium ion, we have synthesized Li_2FeSiO_4/carbon nanofiber (15 % wt) composites by sol-gel method. The composite materials were characterized by x-ray diffraction and scanning electron microscopy. The XRD data confirmed the formation of Li_2FeSiO_4 crystallites with size $\sim$ 25 nm for composites annealed at 600 °C under argon atmosphere. The composite material was used as positive electrode in a coin cell configuration and the cells were characterized by AC impedance spectroscopy, cyclic voltammetry, and galvanostatic charge/discharge cycling. The cells showed a discharge capacity of $\sim$ 230 mAh/g in the initial cycles, which suggests that more than one Li ion is extracted from the electrode. The effect of annealing at higher temperature on the electrochemical performance of Li_2FeSiO_4/carbon nanofiber composites will be presented.

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