Characterizations of new Nasicon type phosphate

Loutati Asmaa

1Faculty Of Science Ben M’Sik University HASSAN II Casablanca, Morocco , Casablanca, Morocco
E-mail: loutati.asmaa@gmail.com

In this work we report the synthesis, structural, optical and magnetic studies of the Nasicon-type phosphate Na$_3$CoZr(PO$_4$)$_3$ and Li$_3$CoZr(PO$_4$)$_3$, which represent a promising candidate as a cathode material for the Lithium and Sodium ions batteries thanks to their good energetic performance and structural stability.

The electrochemical properties of Li$_3$CoZr(PO$_4$)$_3$ were tested in Lithium cells. the X-ray diffraction measurements indicate that the intercalation-deintercalation process of Li$^+$ ions in Li$_3$CoZr(PO$_4$)$_3$ is reversible and that the structural framework is maintained during cycling.

Nasicon type phosphate Na$_3$CoZr(PO$_4$)$_3$ was prepared and tested as the electrolyte for all solid state sodium batteries. The results show that Nasicon type phosphate Na$_3$CoZr(PO$_4$)$_3$ can be used as a promising electrolyte for high performance sodium metal rechargeable batteries and an electrolyte for test high potential cathode materials.

In this work we compare the difference in storage behavior between Na and Li in their analogous electrodes and summarize the sodium storage mechanisms in the available electrode materials. This study also includes some new results from our group on the description of the structure, characterization using the Rietveld refinement of the both Nasicon-type phosphate Li$_3$A(PO$_4$)$_3$ and Na$_3$A(PO$_4$)$_3$.


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