Characteristics of Ti and Fe doped LiCo_{0.6}Ni_{0.4}O_{2} cathode materials for Li-ion rechargeable batteries.

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Abstract. Partial substitution of Fe and Ti was done to replace Co in LiCo_{0.6}Ni_{0.4}O_{2} cathode materials producing LiCo_{0.55}Ni_{0.45}Ti_{0.05}O_{2} and LiCo_{0.55}Ni_{0.45}Fe_{0.05}O_{2} novel stoichiometries and improved behaviour of the materials. The materials were prepared by using a self-propagating combustion method. The materials are found to be single phase and pure of the hexagonal structure and \textit{R}m space group. Results showed that the doped materials perform better than the undoped material and Ti substituted material performs better than the Fe substituted material in terms of first cycle capacity and capacity retention. To further understand the effect of structure and electrochemical behaviour of the materials, quantitative structural studies of the materials were done via X-Ray diffraction (XRD) and using the Rietveld refinement method. It was found that the Fe and Ti doped materials had larger lattice parameters implying greater inter-layer spacings and therefore, increased ease for the movement of the Li\textsuperscript{+} ions.