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In situ study of high voltage performance of \( \text{Li}_x\text{Fe}_2(\text{PO}_4)_3 \) cathodes for Li ion batteries

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In order to meet the increasing demands on energy storage capacities in Li ion batteries, new cathode materials with increased energy density must be developed. One way of achieving this is to use cathodes with multivalent transition metals, which can accommodate more than one Li ion per metal ion. Iron based compounds constitute a very attractive class of cathode materials as they are cheap, environmentally benign, and potentially a candidate for multivalent electrodes, as iron can exist in several different oxidation states. Despite a large interest, cathodes involving Fe\(^{4+}\) have not received the attention as a possible new Fe\(^{4+}\) based cathode material. The work is based on an in situ synchrotron X-ray powder diffraction (XRPD) study of the structural changes, that occur during charging of cathodes containing Fe\(^{4+}\). The change of parameter and an increase in the \( d \)-spacings of the (113) planes in the NASICON framework has been observed. A novel capillary-based micro battery cell for in situ synchrotron XRPD.

References