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Using Synchrotron Based In situ X-ray Diffraction and Absorption and TXM Techniques to Study the New Electrode Materials for Next Generation of Batteries

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The new results of using *in situ* and *ex situ* synchrotron based x-ray techniques, such as x-ray diffraction (XRD), x-ray absorption spectroscopy (XAS), transmission x-ray microscopy (TXM), *in situ* X-ray fluorescence (XRF) microscopy combined with X-ray absorption spectroscopy (XAS), as well as pair distribution function (PDF) application on advanced battery materials will be discussed. Studies on several new materials will be presented, such as LiNi_{0.5}Mn_{1.5}O₄, as high voltage cathode materials, Li-rich and Mn-rich materials as high energy density materials for Li-ion battery, as well as Li-S system for next generation high energy batteries.

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