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Syncroton Radiation-based X-Ray study on energy storage materials: a case for hematite.

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The conventional laboratory characterization techniques provide limited information to better understaning of materials for different optoelectronic applications. In particular, understanding electrochemical mechanisms of materials suitable for energy storage may result in better solutions to the global energy crisis. Synhroton radiation has very high brilliance and broad energy range in the electromagnetic radiation, from far-IR through to hard X-Ray region. The recent availability of synchroton radiation facilities is driving technical and theoretical advances in scattering and spectroscopic techniques over the last few decades. These advances in synchroton based characterization techniques have made it possible to study the underpinning issues in thin films and nanostructured materials used in energy storage devices. An electrochemical roadmap based on much more knowledge-driven approach can be drawn by utilizing synchroton based element specific spectroscopic and scattering techniques. This work presents recent developments in the optimization of materials for efficient energy storage using synchroton radiation.

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