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Electronic structure of cathodes for Li-ion batteries, multi-ferroic materials and iridates investigated by soft X-ray spectroscopies.

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Abstract content

Soft X-ray spectroscopies are nowadays established as primal tools for investigating the electronic and magnetic properties of all kind of materials. In this opportunity I will present three examples where X-ray absorption (XAS), emission (XES) and Resonant Inelastic X-ray Scattering (RIXS) in the soft X-ray regime helped to clarify and understand the electronic structure of $\text{Li}_2\text{Mn}_2\text{O}_4$ (a cathode material for Li batteries), the family of $\text{YbFe}_x\text{Mn}(1-x)\text{O}_3$ (a possible multiferroic material) and iridates with (Sr_2IrO_4 and $\text{Bi}_2\text{Ir}_2\text{O}_7$). In the case of $\text{Li}_2\text{Mn}_2\text{O}_4$, the evolution of the oxidation states of Mn (2p-3d transitions) are followed and correlated with changes in the O K edge (1s-2p transitions) XAS spectra for different stages along the charge/discharge cycle of the Li battery. For $\text{YbFe}_x\text{Mn}(1-x)\text{O}_3$, changes in the electronic structure of the system as Mn content is varied are tracked for Fe, Mn and O in the L_{2,3} and K edges, respectively. Finally, similitudes and differences as reflected in the O K edge spectra for Sr_2IrO_4 and $\text{Bi}_2\text{Ir}_2\text{O}_7$ iridates are presented.

Summary

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