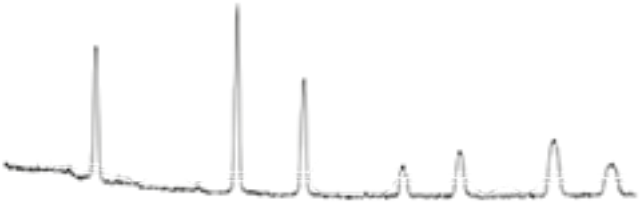

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# Enhancing battery performance by clever tuning of anode materials

*Wednesday, 1 June 2022 14:30 (20 minutes)*

Li-ion batteries are not only omnipresent in portable devices, they are also being increasingly used to power electric vehicles which demands them to possess even higher energy densities. Energy storage capabilities, rate performances and cycling stabilities of Li-ion batteries are strongly dependent on the electrode materials. Practical energy densities accessible with cathode materials are already close to their theoretical limits with the currently available electrolytes. For advanced LIBs technologies, the improvement or replacement of anode materials becomes more paramount than the cathode materials. The widely used graphite anode is stable, but offers low energy density, and suffers from side reactions, which are severe at higher charging rates and low temperatures, leading to eventual capacity fading. Lithium titanium oxide anodes offer much longer life cycles, but have even lower energy densities. Li metal anodes offer the highest possible energy density, but are prone to dendrite formation and thus not preferred for safety reasons. Si anodes offer second highest possible energy densities, but suffer from large volume changes leading to fast capacity fading. This contribution will discuss advances in anode material engineering in above mentioned anodes. It will be demonstrated how battery performances can be enhanced by either altering the anode morphology, or preparing composite anode mixtures, or by applying coatings to anode surfaces. Deeper insights into aging mechanism can be described very well with neutron based analytical methods.

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