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Nanoscale magnetization in lithiated iron oxide nanoparticles

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The search for renewable and sustainable electrical energy storage devices has become vital to meet current environmental challenges [1]. Iron oxides represent a promising,environmentally friendly material [2,3] which can be converted into a lithium intercalating material via chemical lithiation [4]. Owing to their high surface area and thus potential high electrochemical surface activity, nanostructured iron oxides are ideally suitable for use as electrode materials. A continuous lithiation process starting at the materials surface is expected to proceed through different phases. A detailed understanding of the
lithiation progress is therefore crucial for the optimization of chemical lithiation processing.

In this contribution, we apply magnetic small-angle neutron scattering to gain detailed insight into the lithiation progress from the particle surface to the core. We observe the formation of a core-shell nanoparticle morphology, which we attribute to a lithiated shell
that grows in thickness upon lithiation. By correlating chemical and magnetic nanoparticle morphologies, we aim to link the magnetic properties with the degree of lithiation.

References:

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