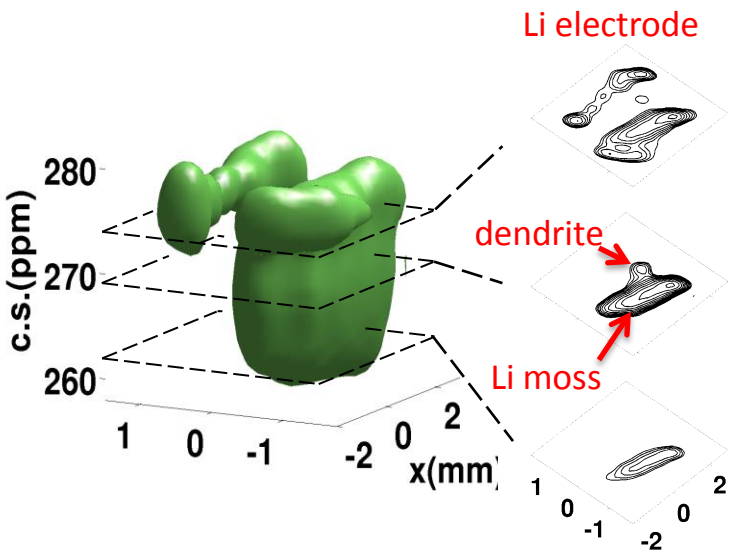
Magnetic Resonance Imaging (MRI) Method Used to Detect Li Dendrites in Lithium Batteries

Scientific Achievement

^{7}Li MRI methods that allow images to be obtained in the presence of metal current collectors and electrodes have been developed. The approach is applied here to identify where Li metal dendrites and microstructure are formed in a battery.

Significance and Impact

MRI provides a non-invasive method to image in three dimensions the *chemical* changes that occur in a working battery. It is element specific allowing, for example, Li environments and concentrations to be monitored. The formation of Li dendrites represent a safety concern in both lithium ion batteries and to-date prevents commercialization of lithium metal batteries.



Chemical Shift (CS) Imaging Can be Used to Determine Where in the Cell the Different NMR Signals (Chemical Species) Come From

Research Details

- 2 and 3D images were acquired of a Li metal symmetric cell, allowing the amount and location of Li microstructure formation (dendrites and moss) to be quantified before, during and after cycling.
- CS imaging was used to obtain images for different chemical species
- Method has been applied to explore Li dendrite formation as a function of rate, electrolyte and electrolyte additive
- Approach extended to study electrolyte concentration gradients in batteries and supercapacitors

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