

## **In-Situ Lithium Ion Concentration Profiles via Confocal Raman Microscopy**

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Lithium ion transport is the fundamental process behind the function of lithium ion batteries, yet there is little agreement on the value of the diffusion coefficient of lithium ions. To help resolve this issue, we propose the use of confocal Raman microscopy to perform in-situ measurements of lithium ion concentration profiles in liquid electrolytes with sub-micron spatial resolution and temporal resolution as fast as 100 ms.

In our first experiment, we measure the temporal evolution of concentration gradients of lithium hexafluorophosphate ( $\text{LiPF}_6$ ) in dimethyl carbonate (DMC) in a one-dimensional diffusion chamber.

We are working to extend this technique to the measurement of in-situ concentration gradients established by the polarization of a symmetric  $\text{Li}/\text{LiPF}_6/\text{Li}$  electrochemical cell. In the future, we will apply confocal Raman microscopy to the measurement of concentration profiles in the vicinity of realistic electrode geometries during charging and discharging.