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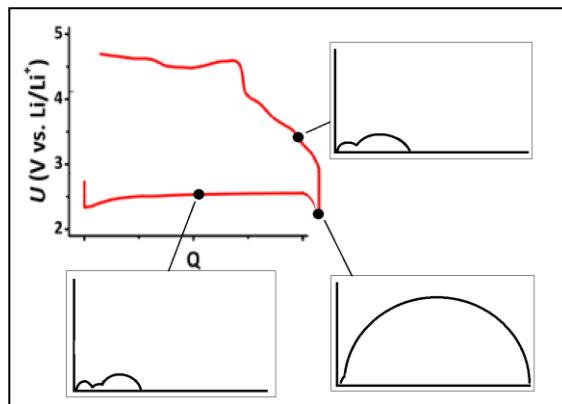
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## IMPEDANCE PERSPECTIVES ON LI-AIR BATTERY OVERPOTENTIALS

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Lithium-air batteries have attracted much attention in recent years because of a potentially high specific energy density and experiments with flat electrodes show that the intrinsic electrochemistry of Lithium-air batteries has a very low overpotential<sup>1</sup>. In real batteries with a porous electrode, the observed overpotentials are, however, significantly larger<sup>2</sup>. The origin of the overpotentials at especially sudden death and during charge has been heavily debated in the literature. Among others, arguments proposed are based on modeling<sup>1</sup>, DEMS measurements<sup>2</sup>, in-situ TEM<sup>3</sup>, and conductivity measurements using a redox-mediator combined with ex-situ characterization methods like FTIR and Raman<sup>4</sup>.



In this presentation, a series of electrochemical impedance spectra measured at different states of charge and current densities will be used to analyze three states of the Lithium-air battery electrochemistry; The discharge plateau, sudden death and the initial stage of the charging process.

By combining the measurements with previous results presented by Bryan D. McCloskey and Alan C. Luntz *et al.* (ref. 1, 2 and 5 among others), the internal resistance in the battery is related to the measured overpotential. This relation is essential to understand the reactions inside the battery.

### References:

- [1] Viswanathan *et al.*, *JPCL* **2013**, *4*, 556-560
- [2] McCloskey *et al.*, *JPCL* **2013**, *4*, 2989-2993
- [3] Shao-Horn *et al.*, *Nano letters* **2013**, *13*, 2209–2214
- [4] Bruce *et al.*, *Nature chemistry* **2013**, *5*, 489-494
- [5] Luntz *et al.*, *JPCL* **2013**, *4*, 3494-3499