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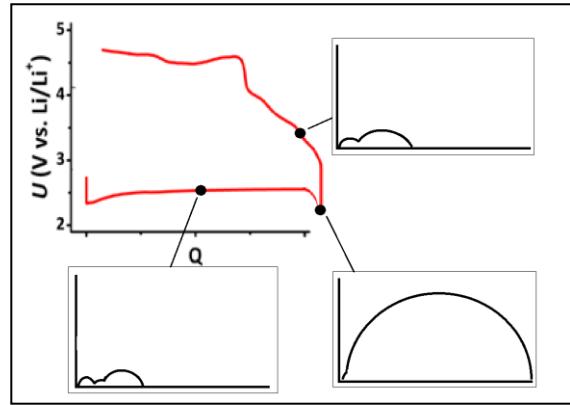
IMPEDANCE PERSPECTIVES ON LI-AIR BATTERY OVERPOTENTIALS

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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 overpotential¹. In real batteries with a porous electrode, the observed overpotentials are, however, significantly larger². 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 modeling¹, DEMS measurements², in-situ TEM³, and conductivity measurements using a redox-mediator combined with ex-situ characterization methods like FTIR and Raman⁴.



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