Determination of Solid-State Li Diffusion Coefficient of Lithium Insertion Materials from Rate Capability Tests on Diluted Electrode

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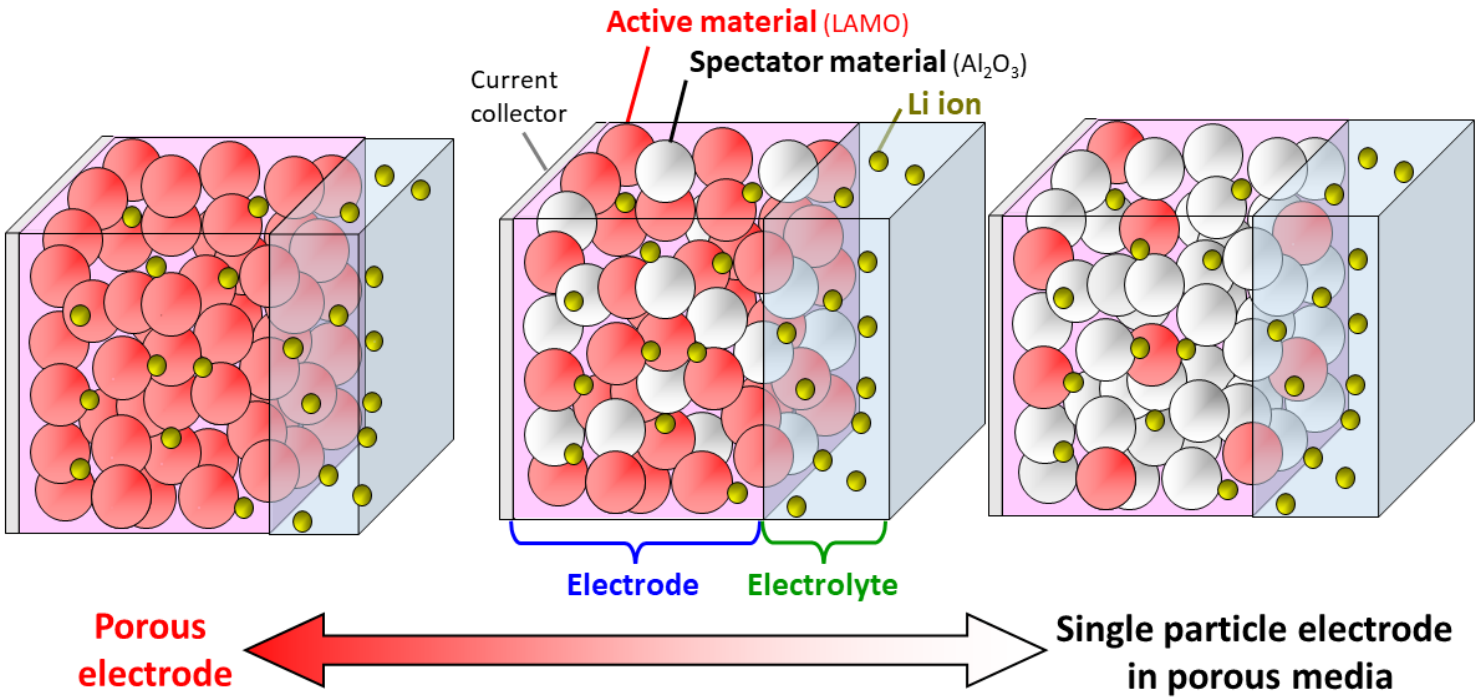
What is the Diluted Electrode Method ?

The "**diluted electrodes**" can replicate electrode structures by changing the ratios of the materials without significant changes in an electrode weight, thickness, and porosity.



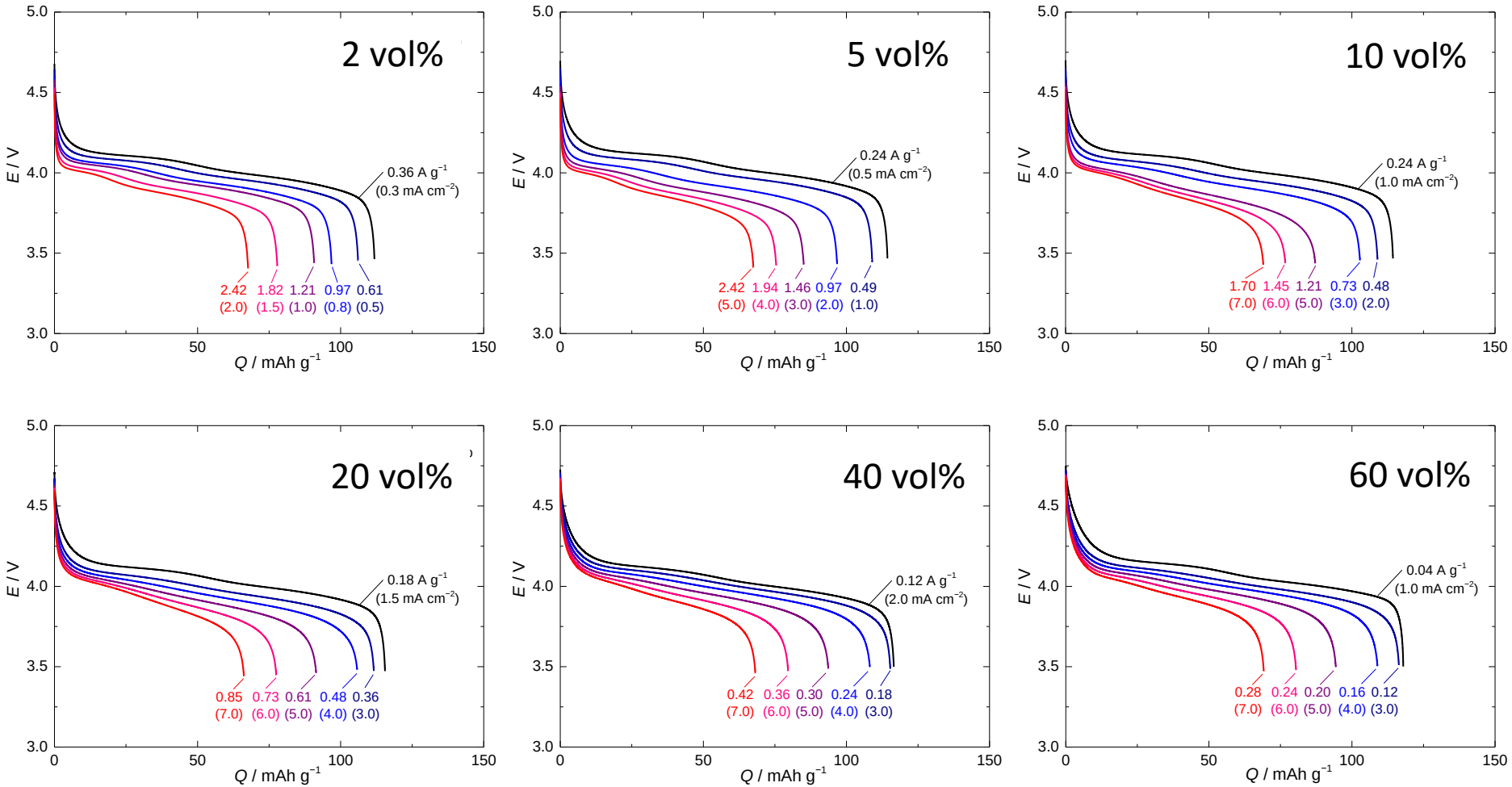
- ✓ Estimate R_{ct} of LAMO from impedance spectra

  K. Ariyoshi et al., *J. Electrochem. Soc.*, **165**, A3965 (2018).

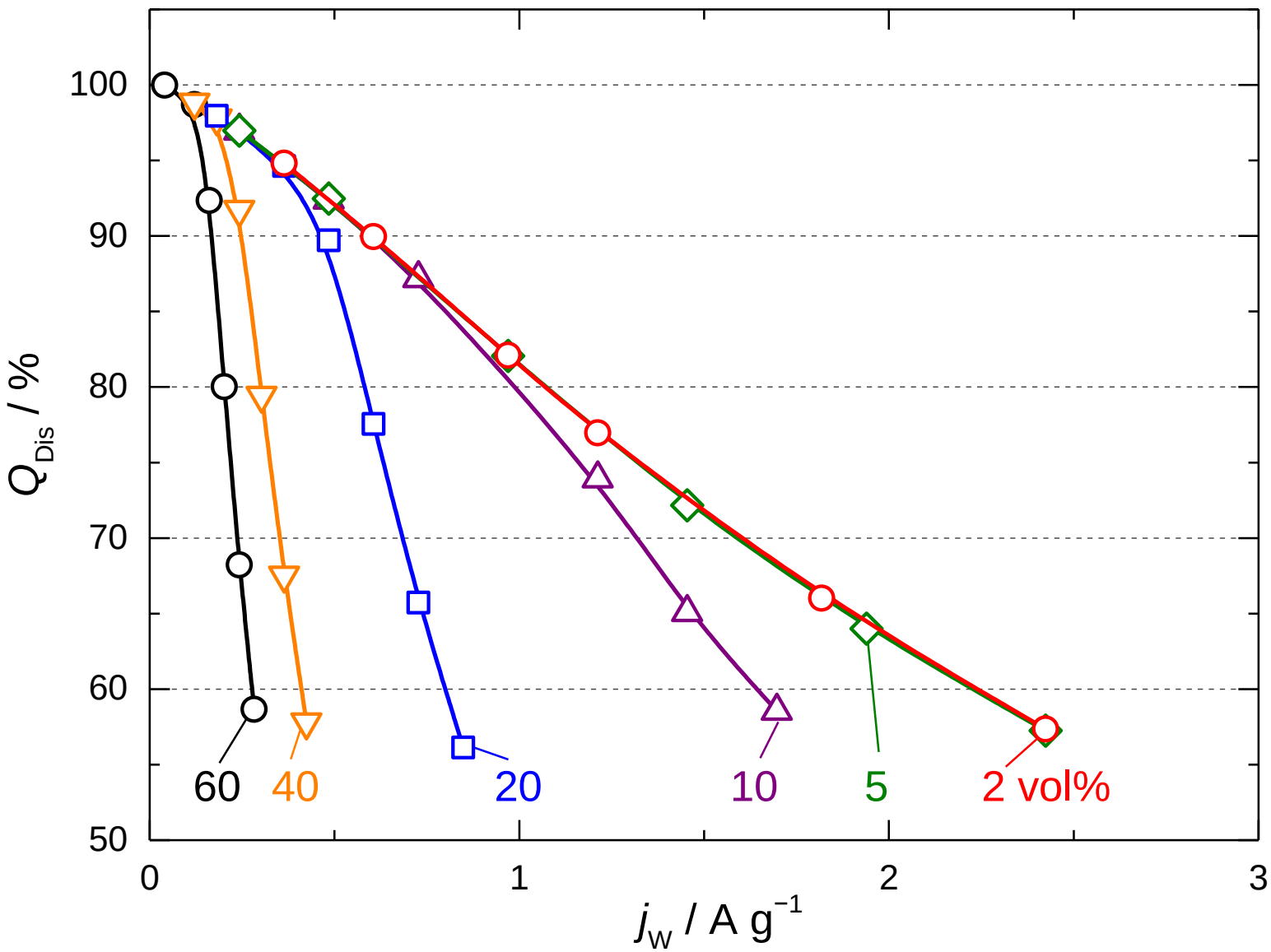
- ✓ Determine the rate-determining step for LAMO

  K. Ariyoshi et al., *J. Power Sources,* **435**, 226810 (2019).

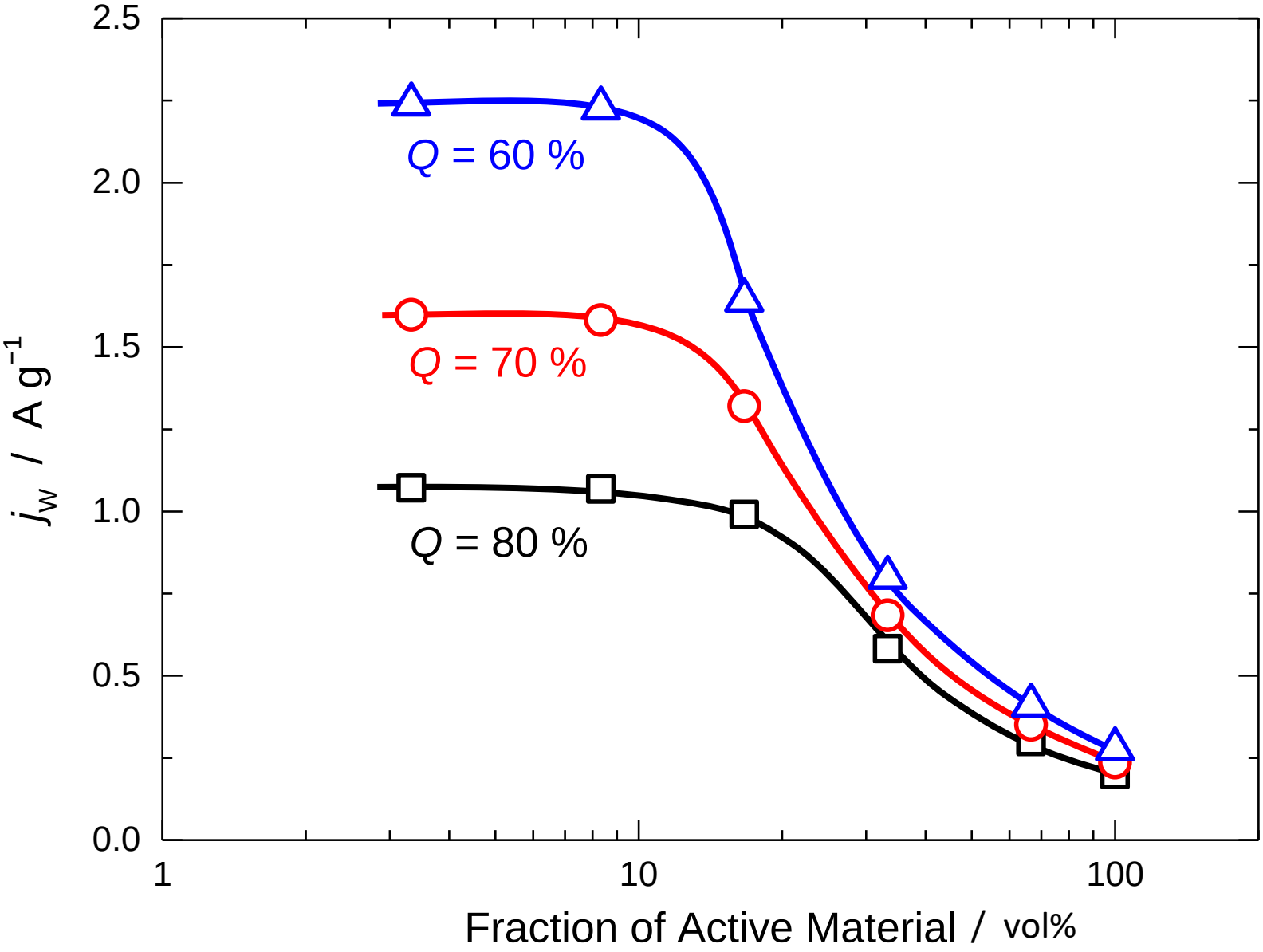
Simulated Charge-Discharge Curves



Q_{Dis} versus j_W plots

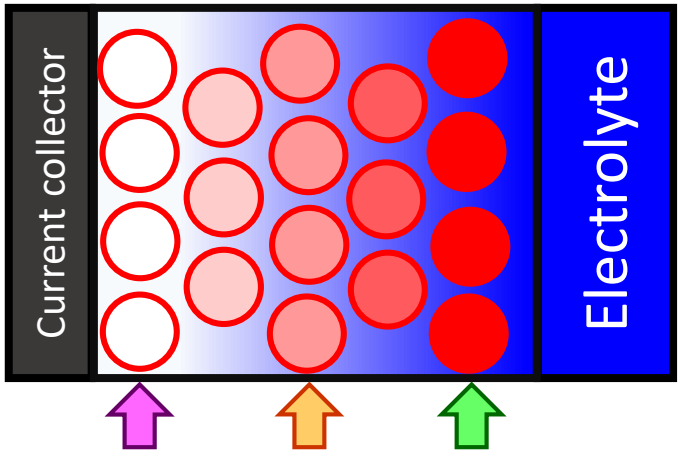


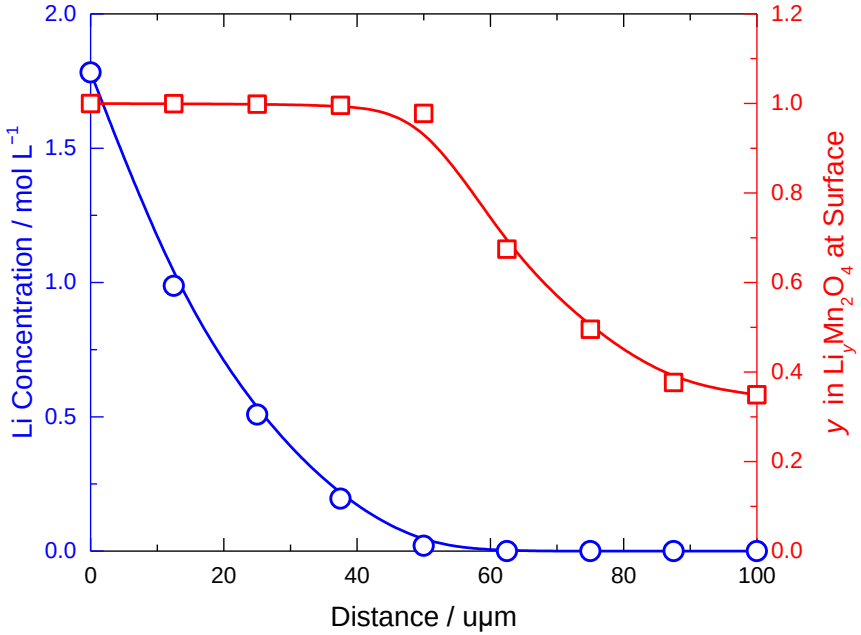
j_W @ Q_{Dis} as a function of Fraction of Active Material

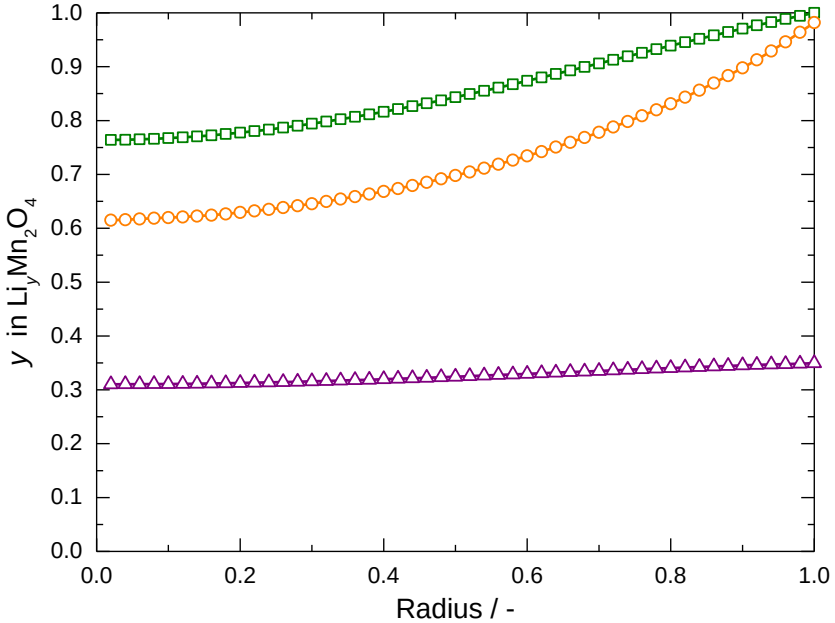


Conventional Electrode : 60 vol%

r.d.s. : Li^+ diffusion in the liquid pahse

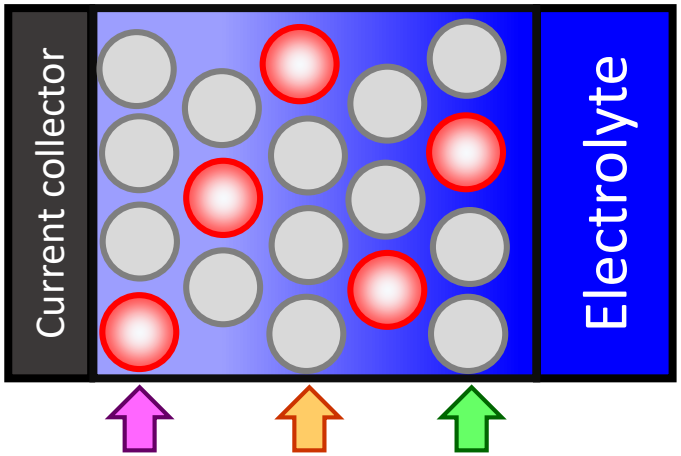


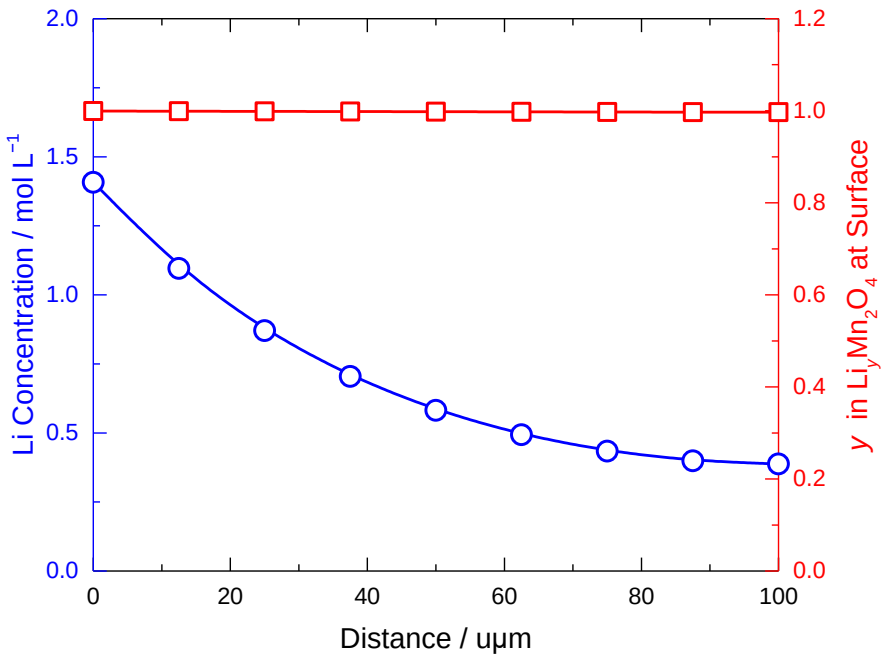


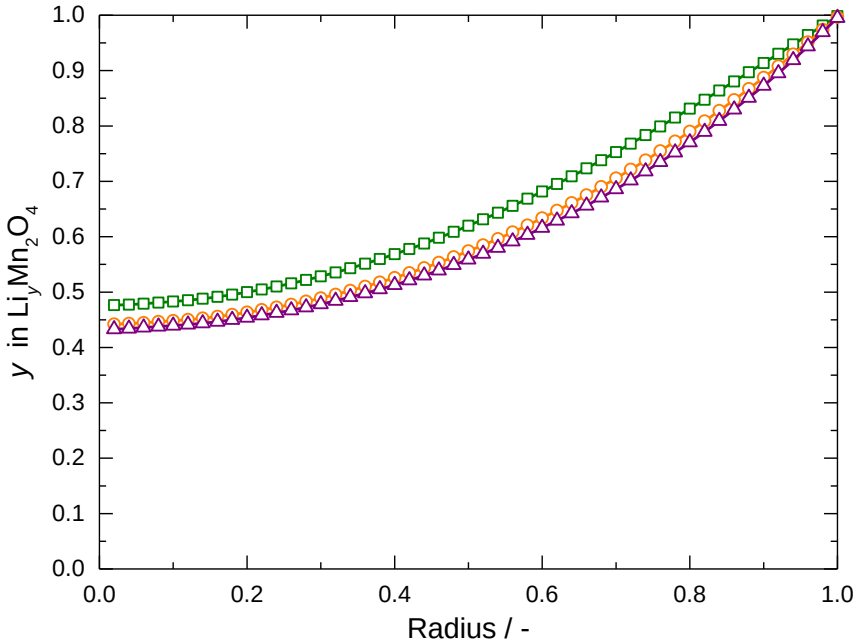


Diluted Electrode : 5 vol%

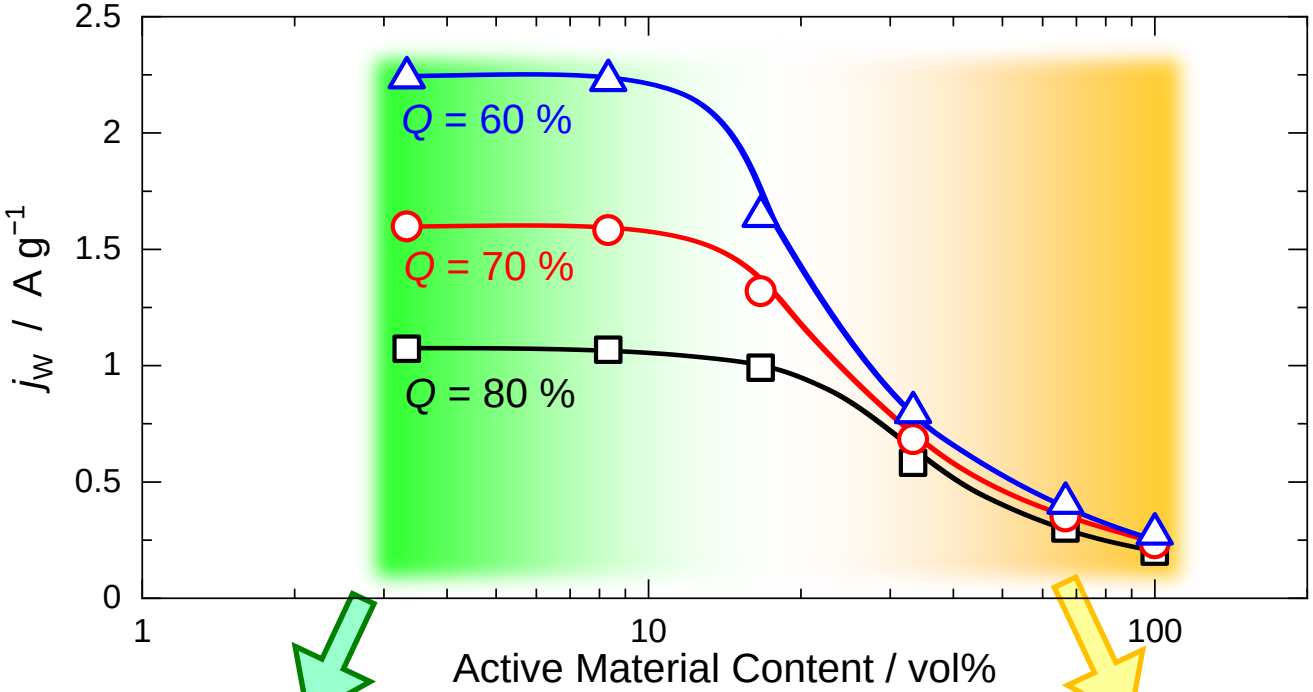
r.d.s. : Li^+ diffusion in the solid phase



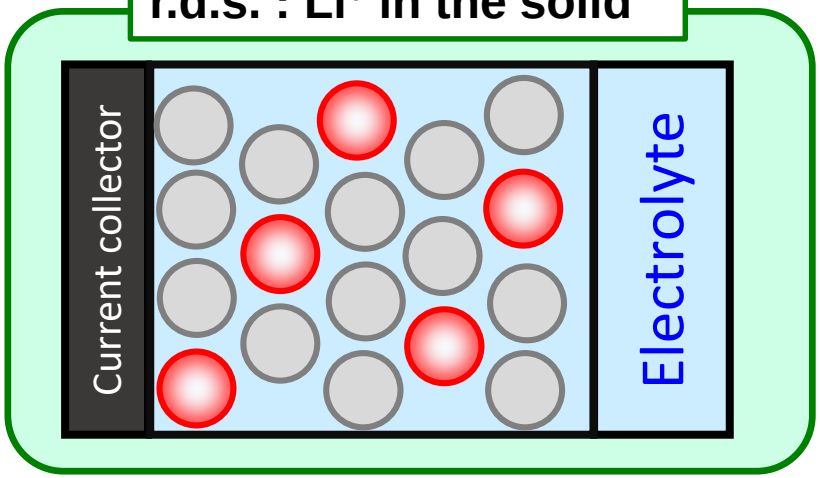
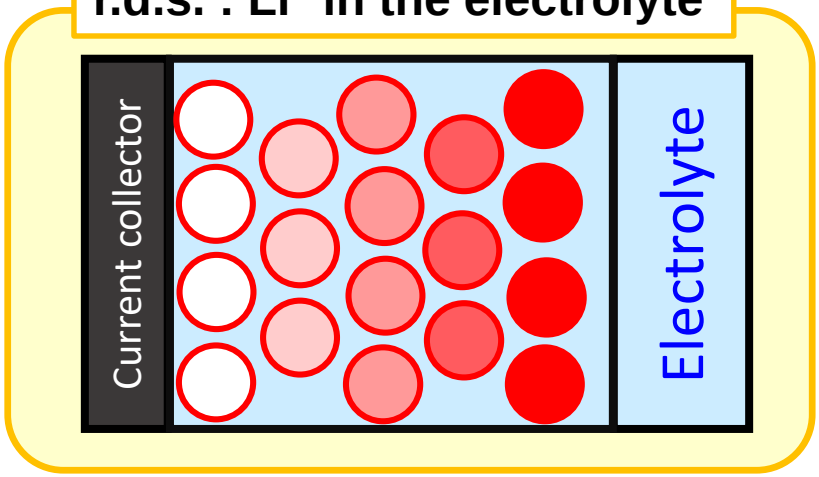




Rate Determining Step for Diluted Electrodes



r.d.s. : Li^+ in the solid



r.d.s. : Li^+ in the electrolyte