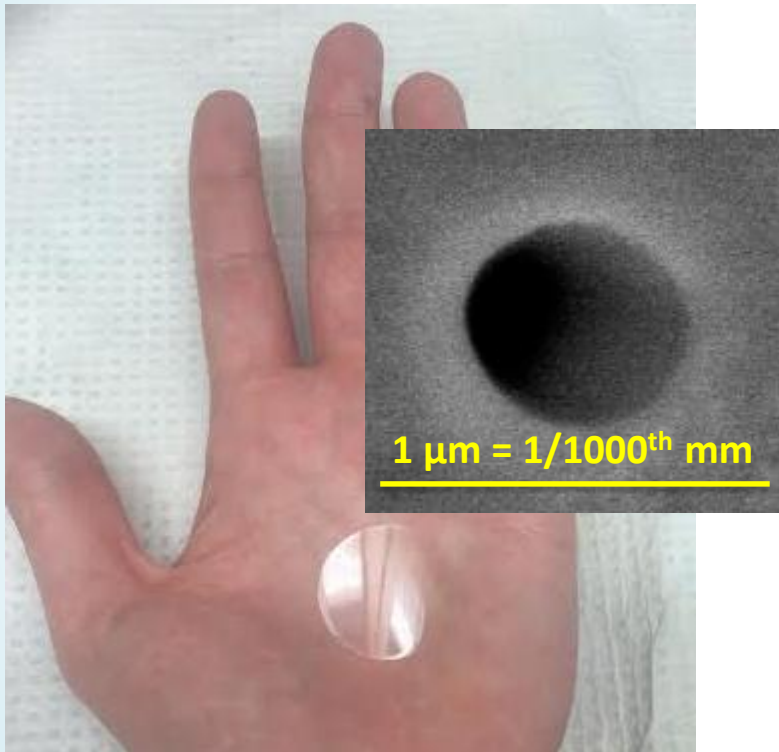


# Optimizing Nanobatteries through Interface Science

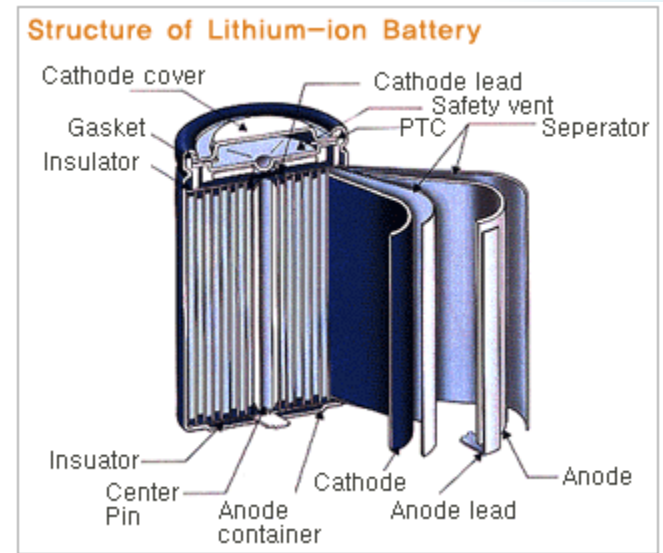
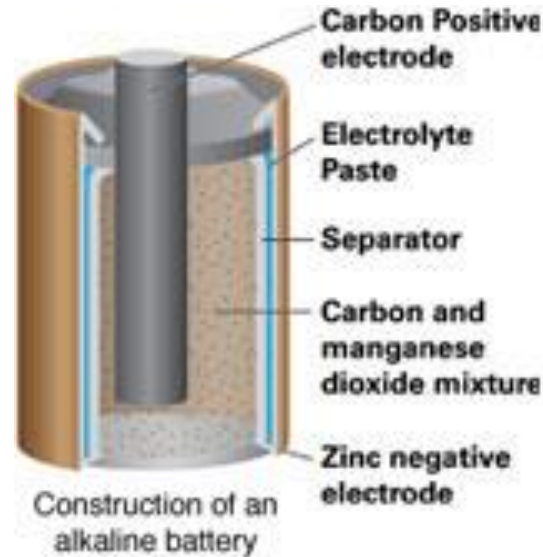
Timothy Plett, Physics  
April 22, 2016  
AGS Symposium

# What does that mean exactly?



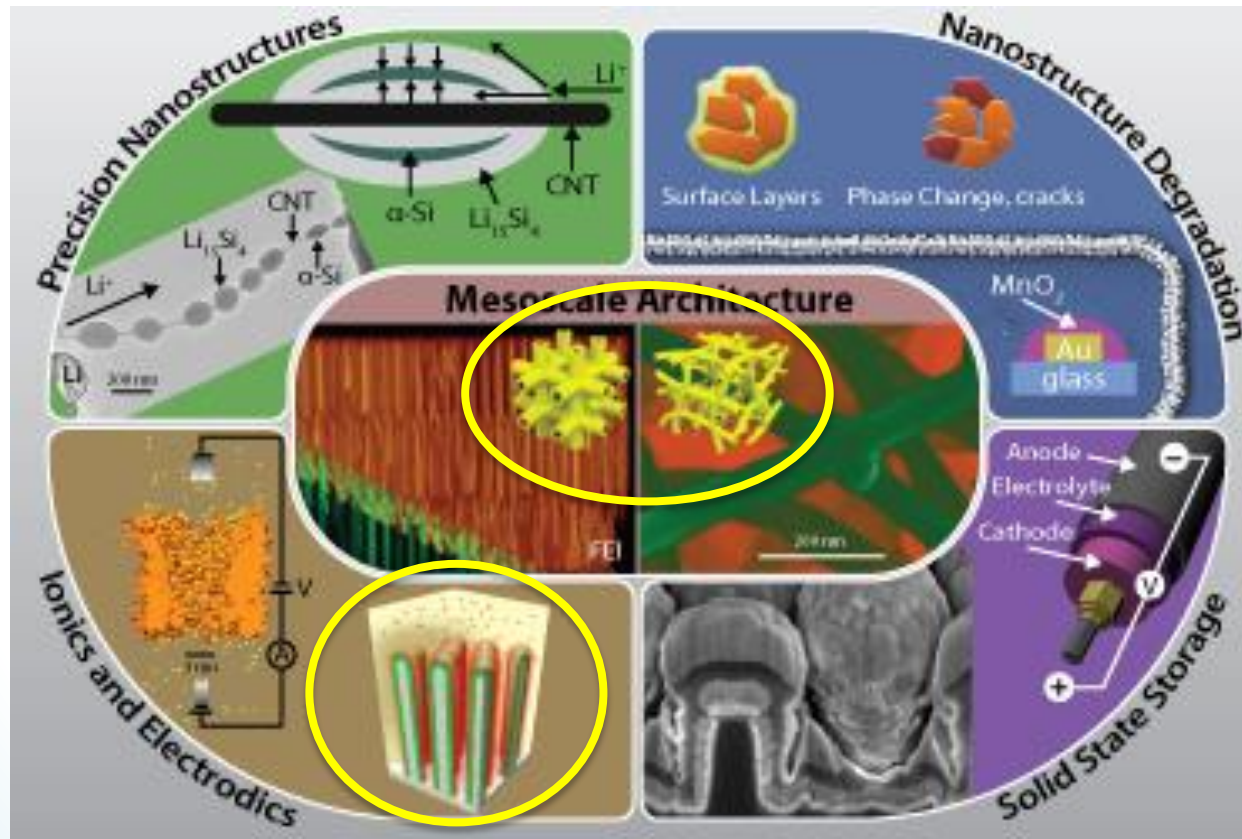
Micro- and Nanoscale  
phenomena can make  
Macroscale differences

# Standard Battery Design for Alkaline and Li-Ion



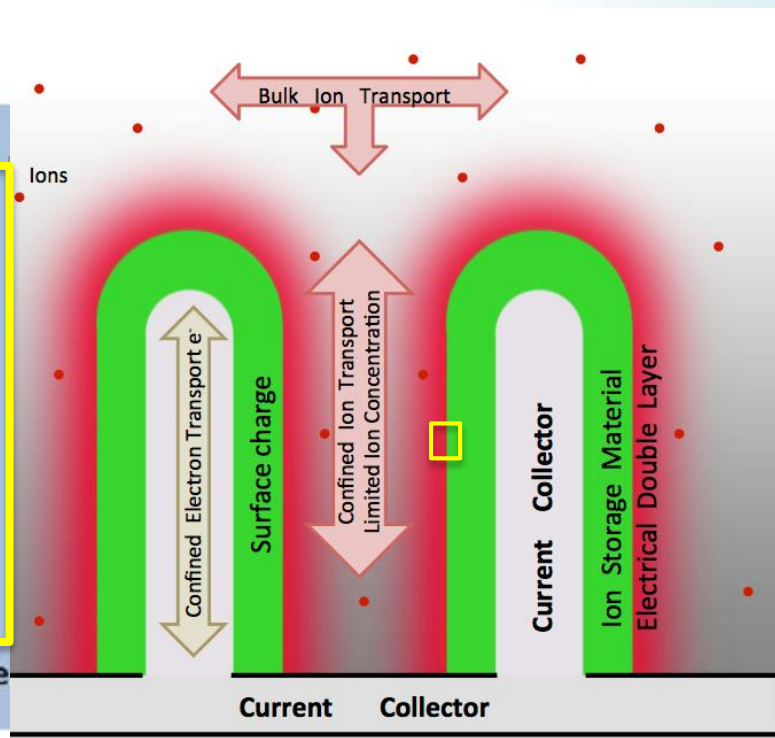
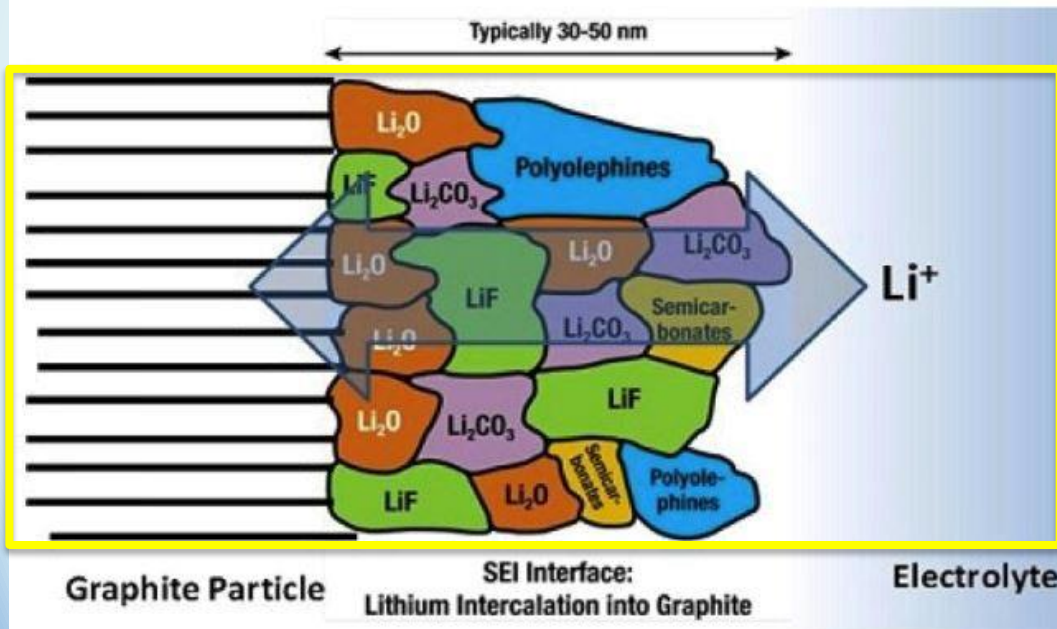
Mainly based on 2-D design principles

# NEES – Nanostructures for Electrical Energy Storage



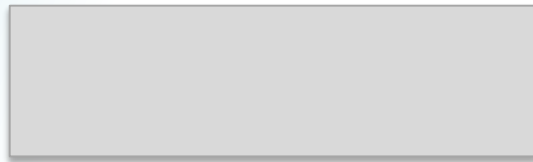
# Interfaces and Nanobatteries

## The Classical Electrochemical Interphase

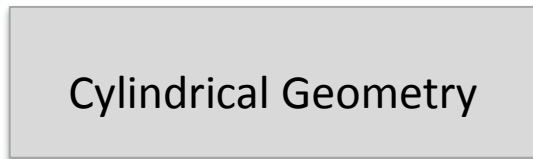


Nanopores can isolate these phenomena and study them in a controlled environment

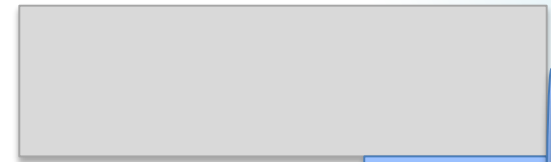
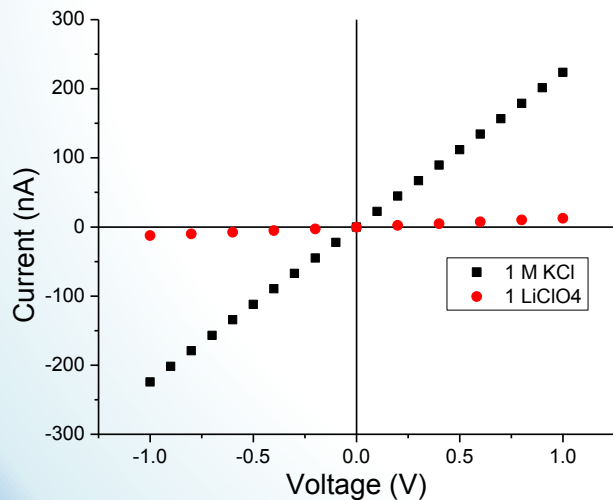
# What Nanopores Have Done



$\sigma_1$

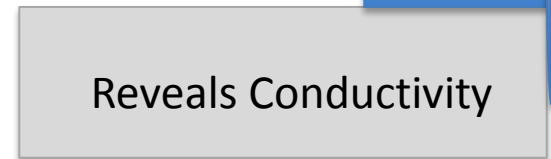


Cylindrical Geometry

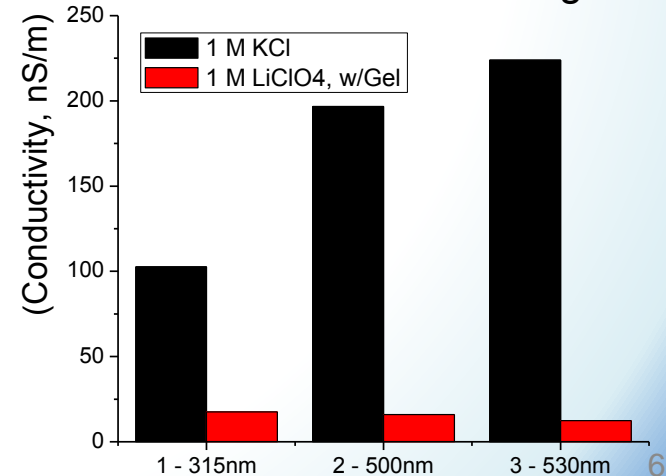


$\sigma_1$

$\sigma_?$

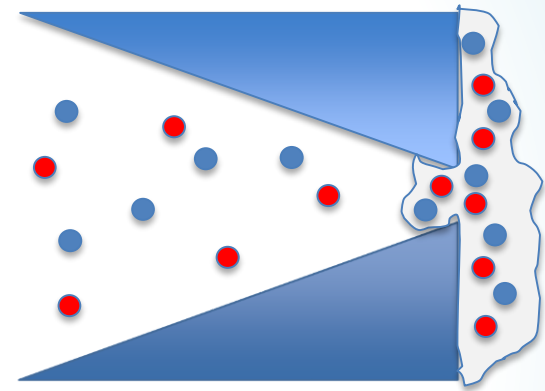
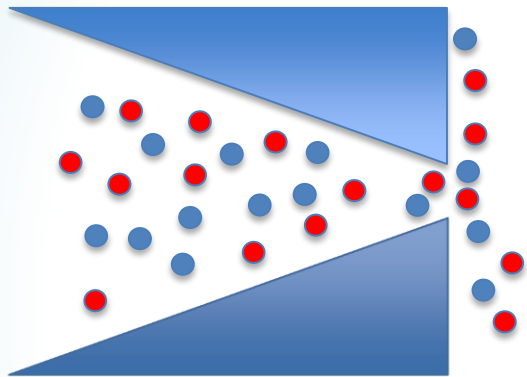


Before/After Gel Loading

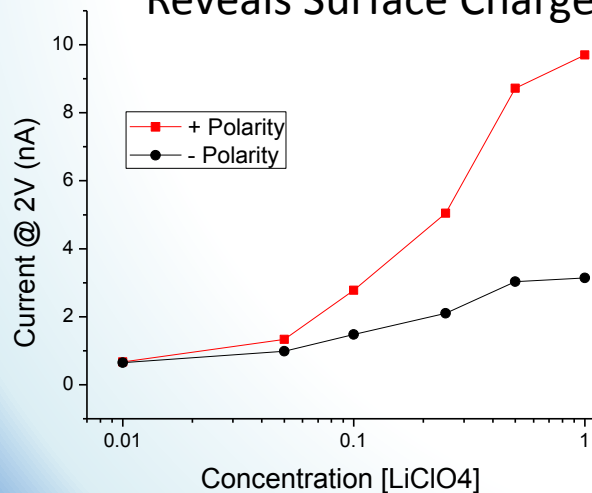


# What Nanopores Have Done

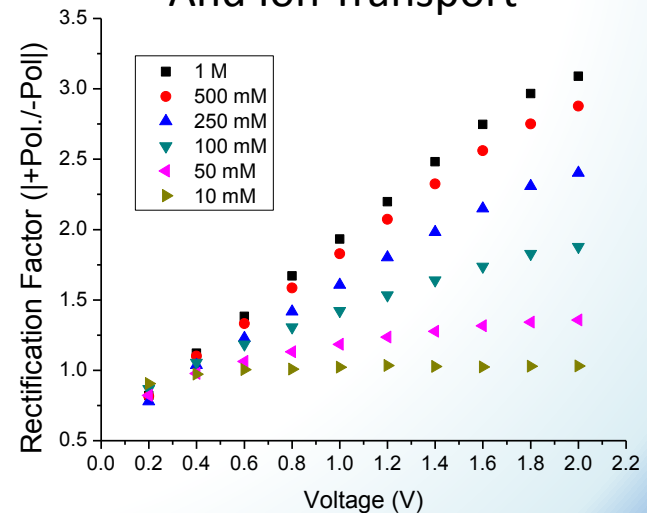
Conical Geometry



Reveals Surface Charge



And Ion Transport



# Supercharge my next Tesla?

Maybe... in a couple years...

