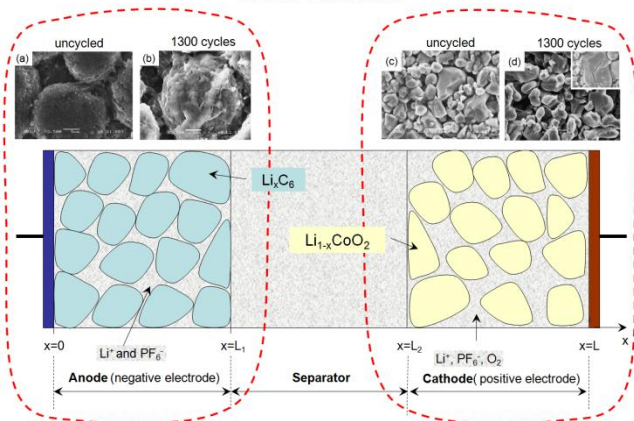


Microstructure effects on the capacity, power, and energy density of metal-air batteries for large grid storage applications

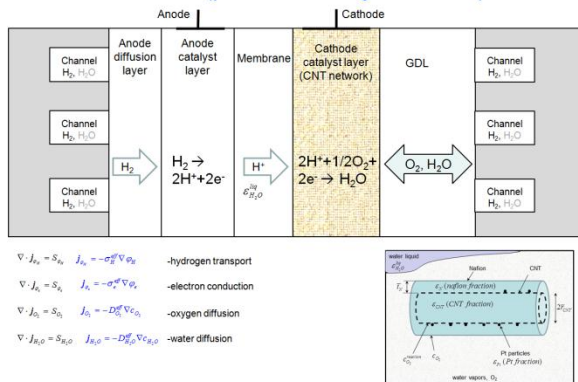
Petru Andrei and Vamsi Bevara

Department of Electrical and Computer Engineering
Florida A&M University and Florida State University, **Tallahassee**, FL 32310

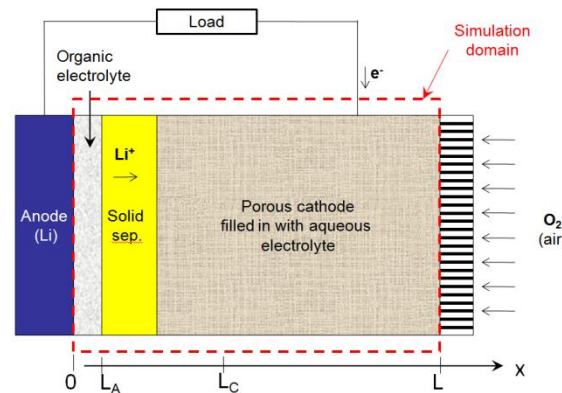
Li-ion batteries



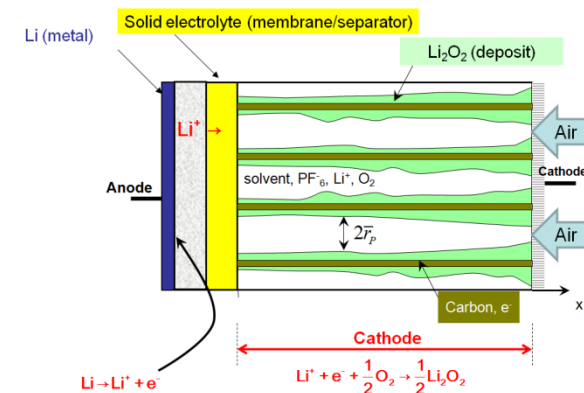
Fuel cells (proton-exchange fuel cells)



Li-air batteries with dual electrolyte



Li-air batteries with organic electrolyte



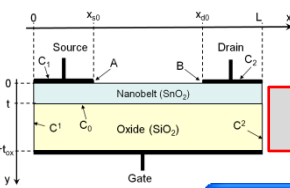
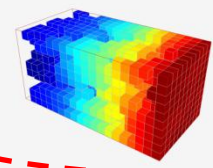
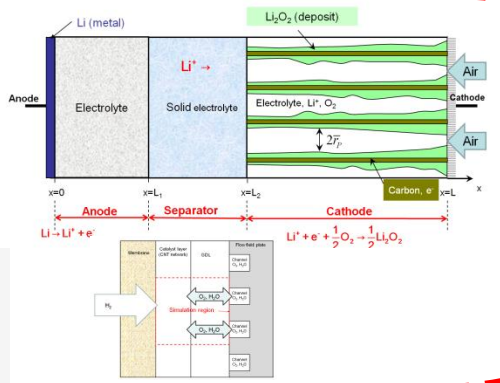
RandFlux[®] - device/mixed mode simulation

Loading... C:\Documents and Settings\Administrator\Application Data\RandFlux\Circuits\Circuit1.cir
3 seconds remaining

Electrode on semiconductor
Electrode extends on both semiconductor and on the oxide
Electrode on oxide
Semiconductor 1
Oxide
Metal
Semiconductor 2
Gate electrode
Electrode on metal

Semiconductor device

Li-air cells
Li-ion battery
Fuel cells



Sensor

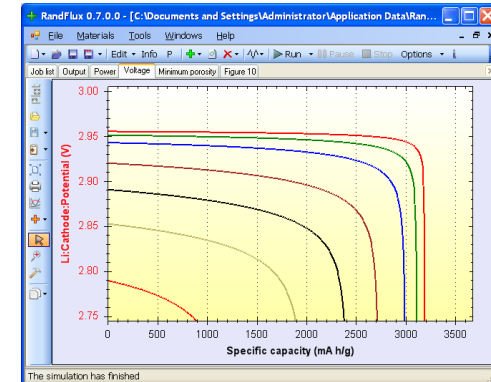
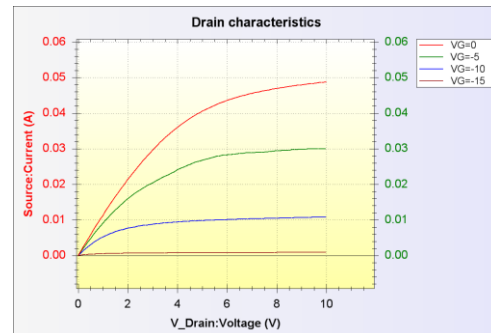
SPICE device

RandFlux 0.8.0.0 - [C:\Documents and Settings\Administrator\Application Data\RandFlux\Circuits\CircuitAll1.cir]

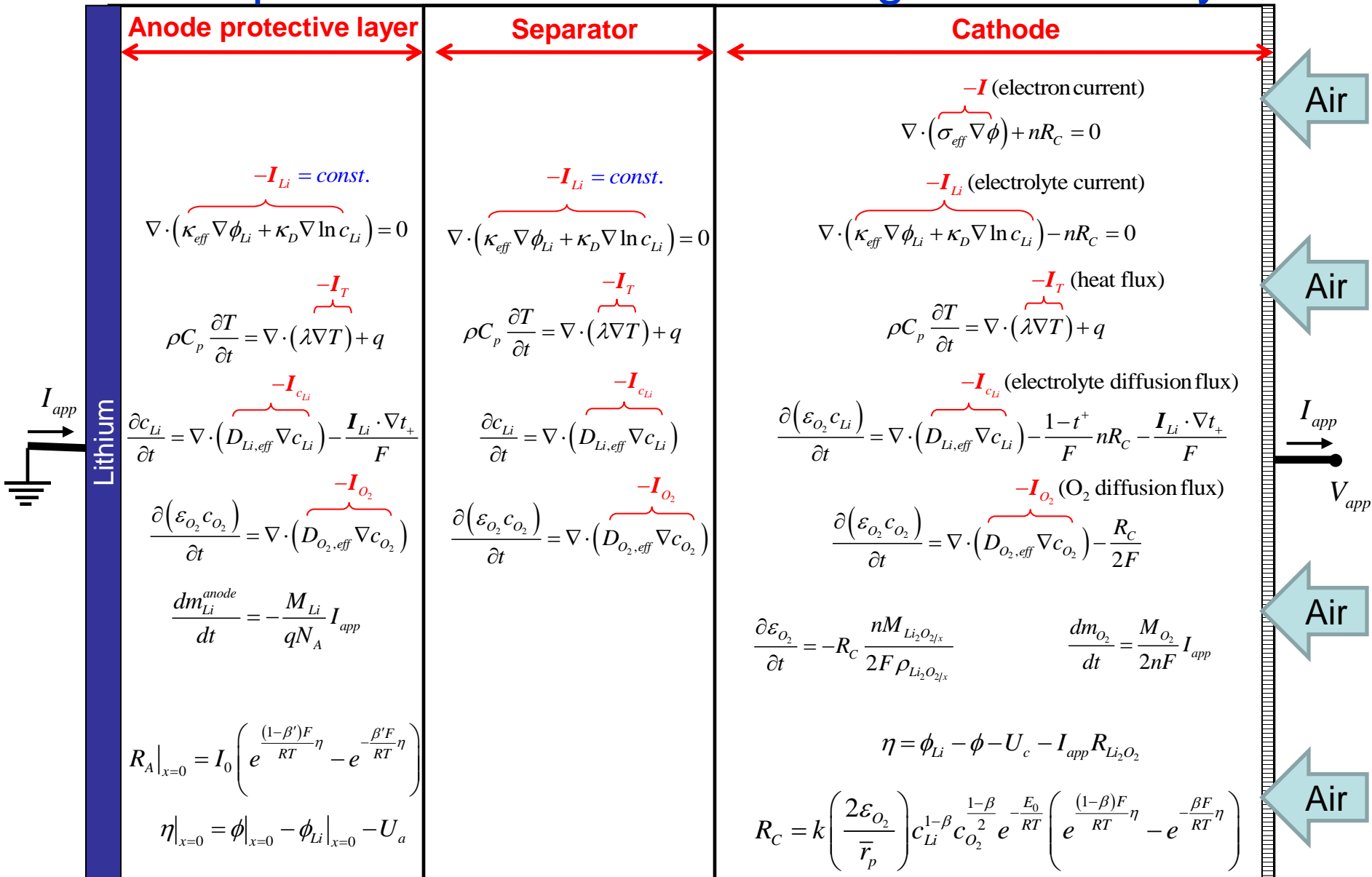
1-terminal, Numeric devices
• Current Probe
• Current Probe
• Ground
• Pin
• Potential Probe
• Potential Probe
• Wire, node

2-terminal, Numeric devices
+ Capacitor
+ Current Probe
+ Current source (AC)
+ Current source (AC)
+ Current source (DC)
+ Dependent current source
+ Dependent resistor
+ Dependent voltage source
+ Diode
+ Hysteretic inductor
+ Inductor (ideal)
+ Inductor (real)

Analytical device

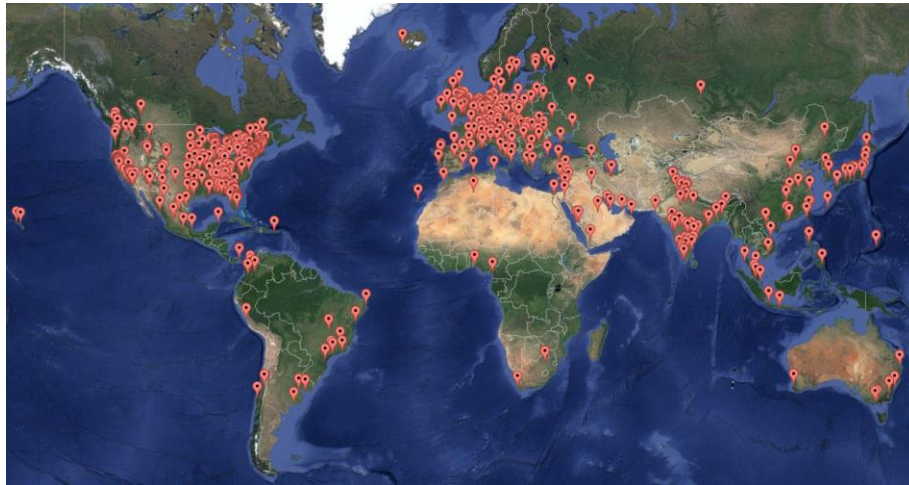


Example: Li-air batteries with organic electrolyte

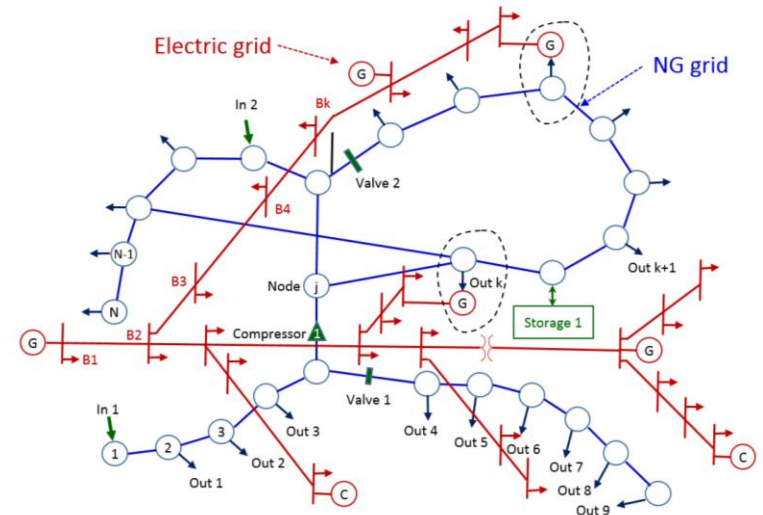
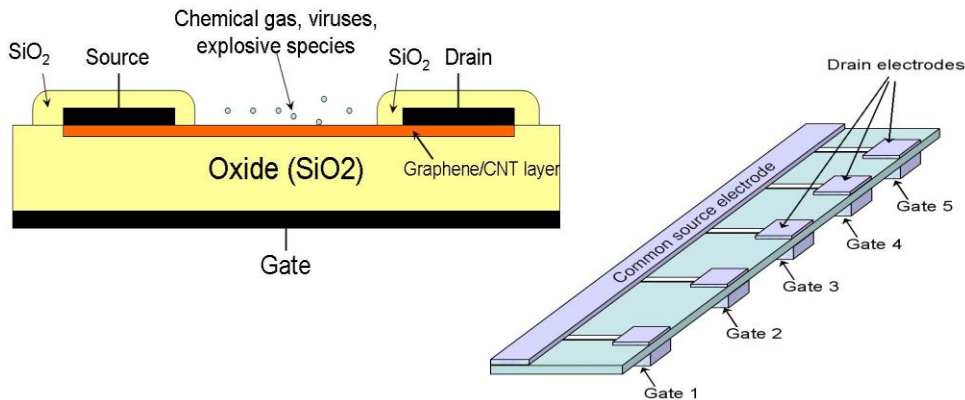
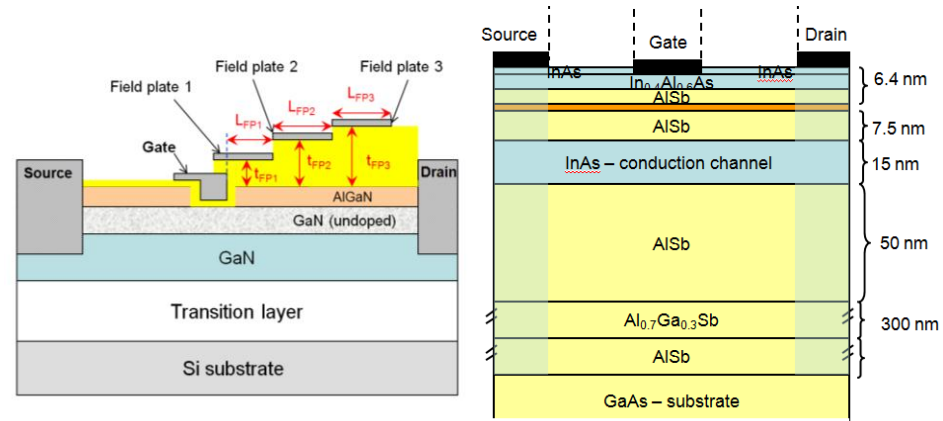


RandFlux[©] - device/mixed mode simulation

www.eng.fsu.edu/ms/RandFlux

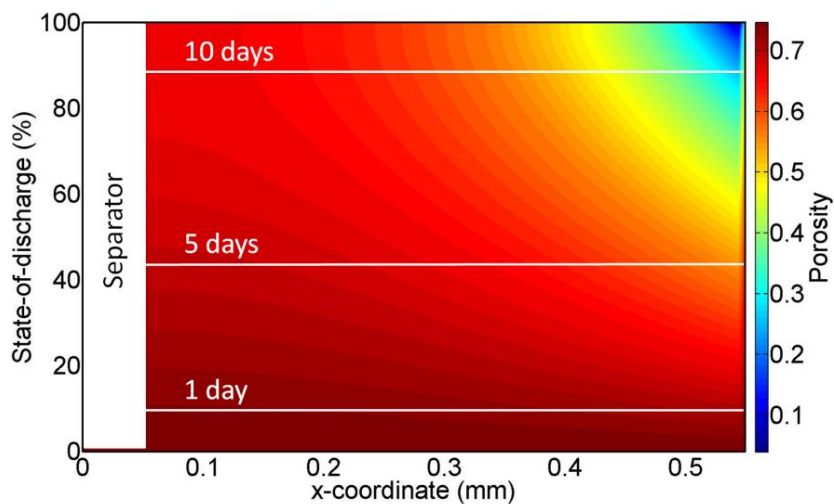
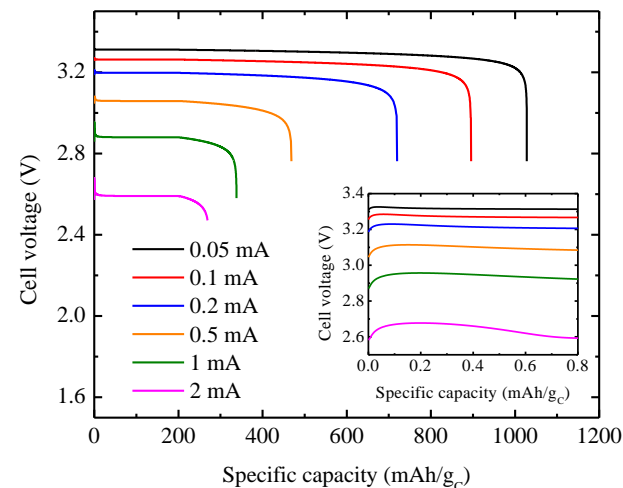
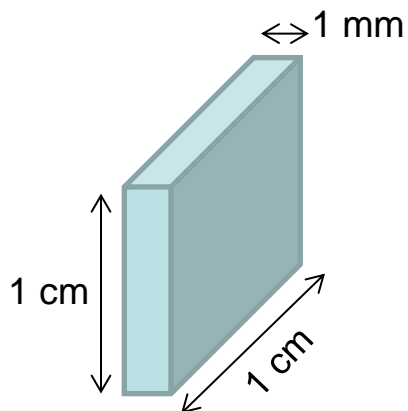


- **over 3,000** users registered with RandFlux[©] since 04/2009
- **over 18,000** visitors between since 04/2009

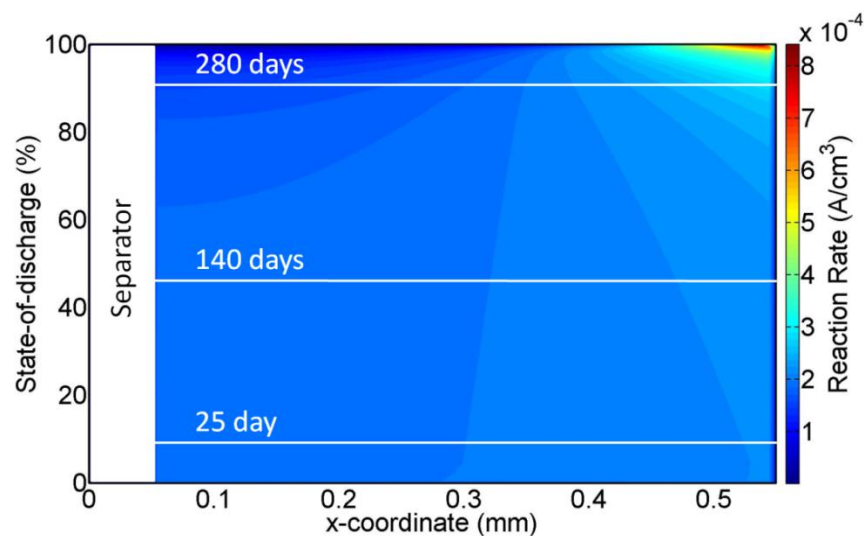


Li-air batteries with organic electrolyte

Simulation results



I = 1 mA



I = 0.1 mA