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Extracting State Information from Batteries with Electrochemical Acoustic Signal Interpretation (I)

Tuesday 12 June 2018 08:00 (30 minutes)

We have recently determined a correlation between the acoustic response, state of charge and state of health of closed system electrochemical energy storage systems. Because a closed cell is a mass redistribution reactor, and in a standard cell the volume is effectively fixed, the distribution of density within a battery must change as a function of state of charge and, along with density, the elastic moduli of the anode and cathode changes as well. Since

cs = sqrt(E/rho)

This basic relation establishes a link between acoustic behavior and battery state. In this presentation we will review the physical basis of our hypothesis and present progress in

1. Correlating structural evolution and failure analysis with acoustic signal evolution
2. Preliminary inverse models which describe the changes we see in the acoustic/state of charge response
3. "Physics free"machine learning results to examine the uniqueness of an acoustic signal for a given battery in a given state of charge and health.

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