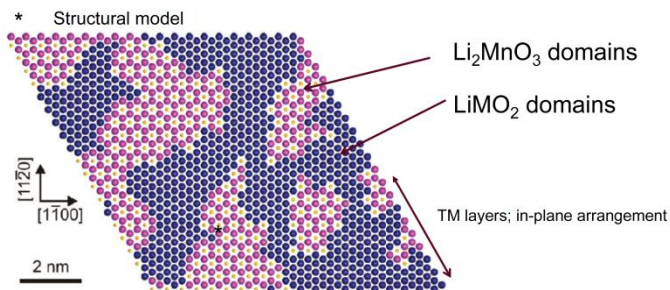
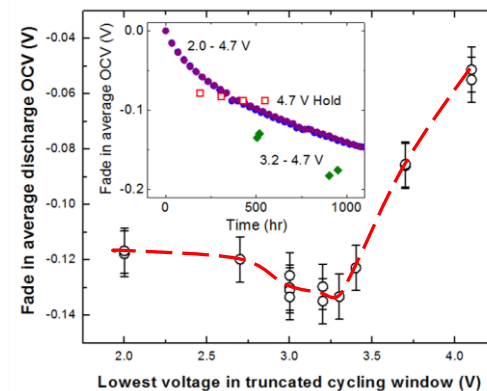
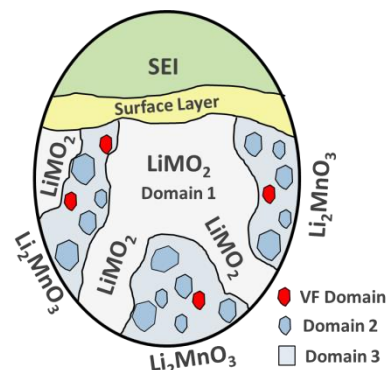
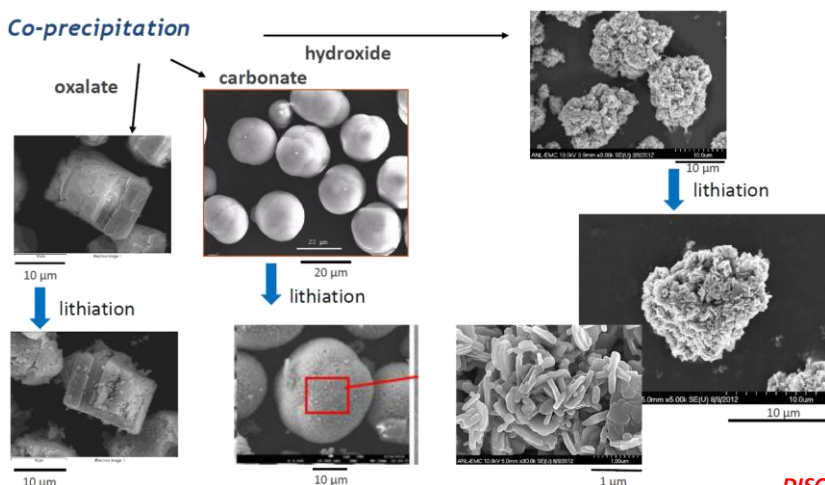
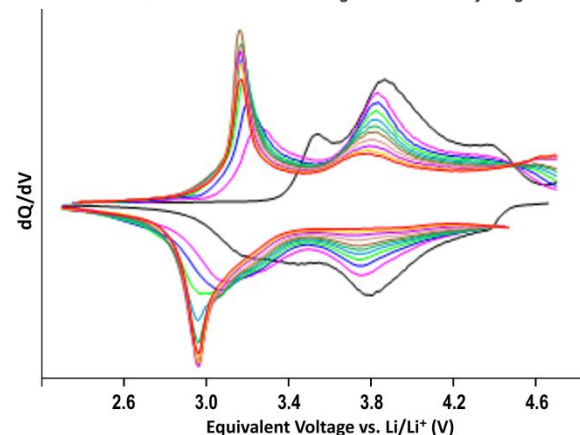
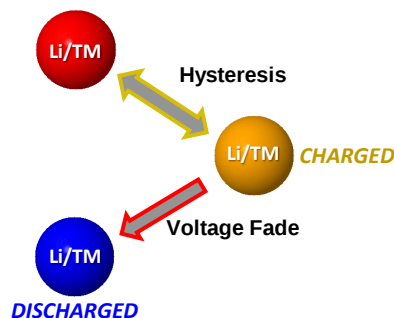


Co-precipitation



DISCHARGED



**The Voltage Fade Project:
a New Paradigm for Applied
Battery Research**

Peter Faguy
Energy Storage
Hybrid and Electric Systems Team

The Voltage Fade Deep-Dive Project – a new approach



par·a·digm NOUN

- ❑ *a model or pattern for something that may be copied*
- ❑ *a theory or a group of ideas about how something should be done, made, or thought about*

WHAT'S NEW ?

- ✓ **Address a complex, multifaceted barrier through strongly coupled research tasks: synthesize, characterize, test hypotheses, measure performance, etc.**
- ✓ **Expect that the combination of outcomes, the feedback loops generated, and the shared understanding would be more valuable, and expedite next steps, relative to the sum of many non-integrated research tasks.**

The Voltage Fade Deep-Dive Project – Summary

- ✓ Collecting data the same way – comparisons possible
- ✓ Data are presented the same way and all data are uploaded to the database – leads to real debate and overall understanding
- ✓ Others in the team validate the results
- ✓ Consensus outcomes

Results: **Significant expansion and solidification of Vfade knowledge base**

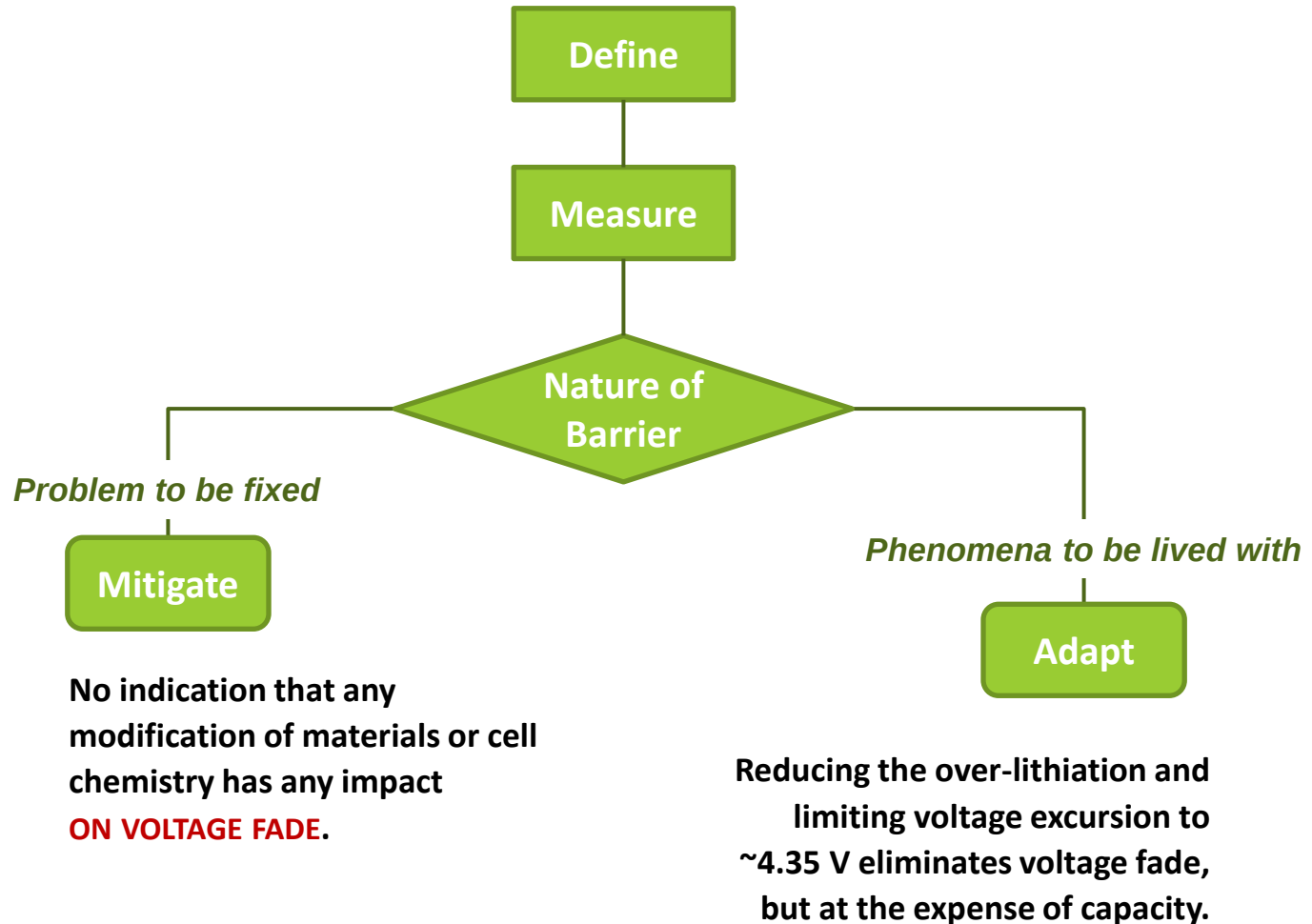
No indication of any 'fix' → no mitigation route YET has been identified

Voltage Fade Team

- Over forty scientists, engineers, and technicians resident across the national lab complex worked on the Vfade issue.
- Input from industry and academia.



Resolving the Voltage Fade Issue



Oral Presentations Thursday Morning, June 19th, 2014

8:30	ES-190	Synthetic Approaches ...
9:00	ES-194	Understanding Structural Changes ...
9:30	ES-187	NMR as A Tool ...
10:00	ES-193	Atomic-Scale Models ...
11:00	ES-188	Electrochemical Characterization ...
11:30	ES-189	Electrochemical Modeling ...
12:00	ES-161	Voltage Fade ... Status and Outcomes