How do we characterize and control matter away - especially very far away - from equilibrium?

**Progress on Grand Challenge**

Using the model reaction Li + FePO$_4$, NECCES has been able to predict, see, characterize and control the matter (reaction pathway – intermediate matter) away from equilibrium for use as a battery electrode.

**Remaining Challenge**

- Little is known about the impact of particle size, composition. Shown only for nano-sized particle so far. Need for all electrochemically active materials
- Yes, this should be tractable on the decadal scale, and works with the Materials genome.

**New Horizons for Grand Challenge**

This grand challenge is critical for all reacting energy systems, which are by their very nature away from equilibrium and in some case far from equilibrium. The focus/scope of the Grand Challenge is appropriate?

**Refreshed Grand Challenge?**

- A new statement of the Grand Challenge is not needed?
- There is much needed to be done, and as the Materials Genome stated this will take 10 years, so this Grand Challenge should not be retired.