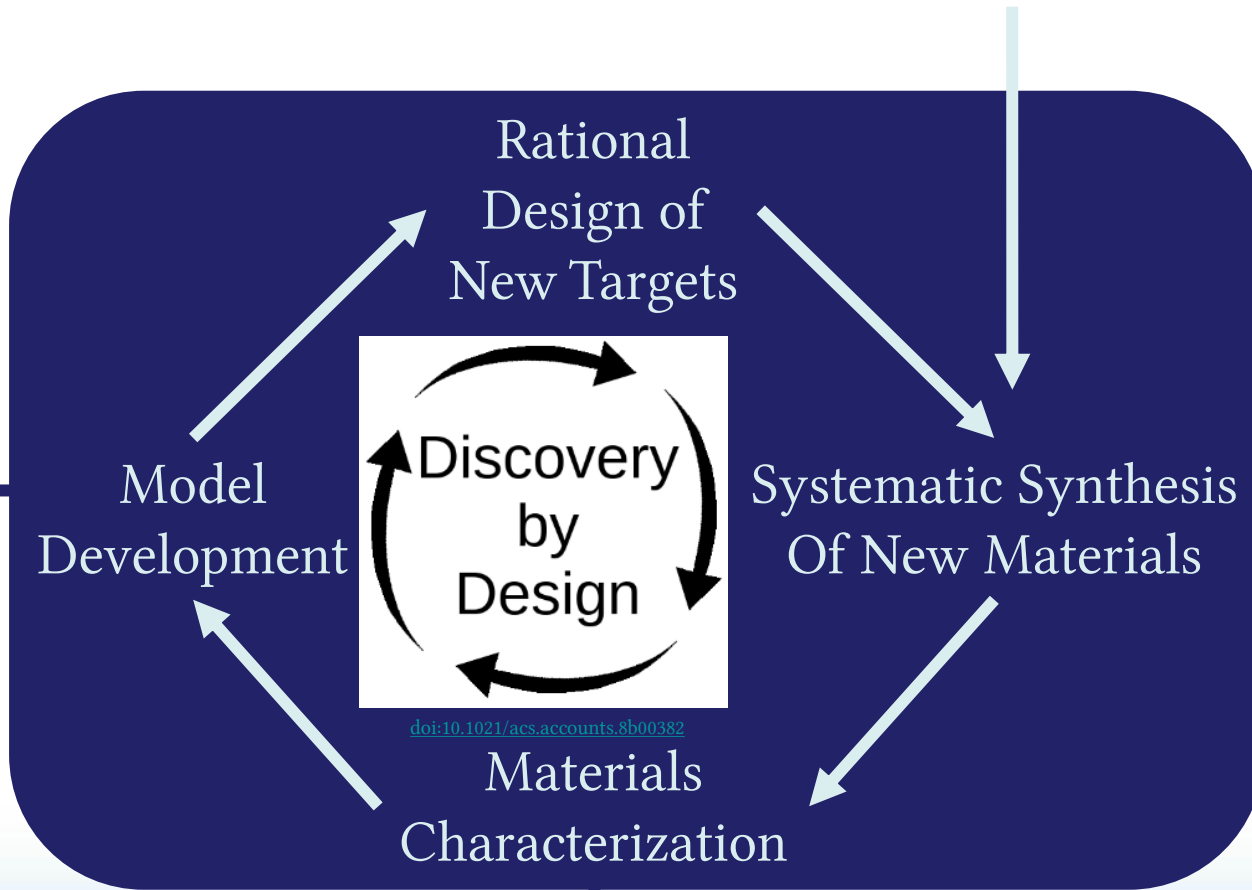




Materials Discovery

Useful Devices
Out

Need → Identification of Desired
Materials Properties



"What's the opposite of Eureka?"

Danna Fradon

Discover New Phenomena





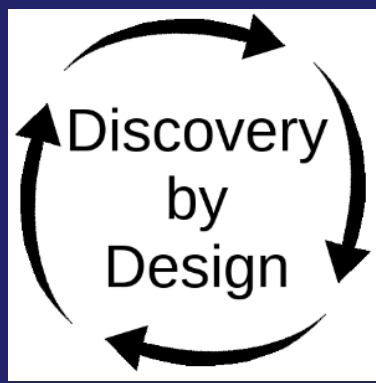
Materials Discovery

Useful Devices
Out

Need → Identification of Desired
Materials Properties



Rational
Design of
New Targets

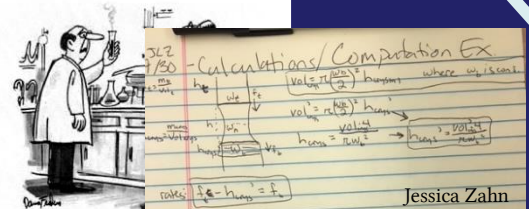


Systematic Synthesis
Of New Materials



Model
Development

Materials
Characterization



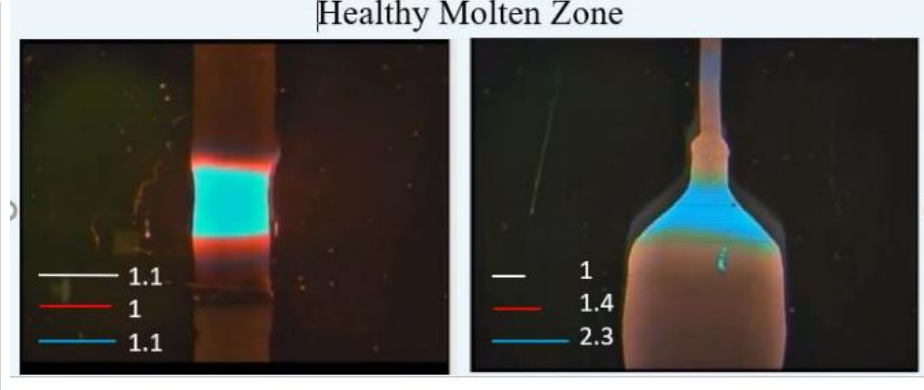
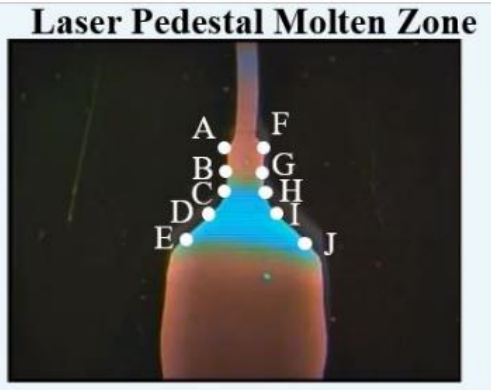
Discover New Phenomena

JOHNS HOPKINS UNIVERSITY | Tyrel M. McQueen
Professor of Chemistry,
Physics, Materials Science

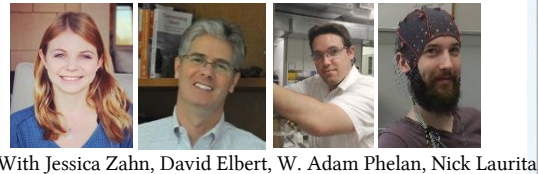
INSTITUTE FOR QUANTUM MATTER | NSI PARADIM
IQM-EFRC research funded by the U. S. DOE, Basic Energy Sciences,
Materials Sciences & Engineering Award: DE-SC0019331
PLATFORM FOR THE ACCELERATED REALIZATION,
ANALYSIS & DISCOVERY OF INTERFACE MATERIALS



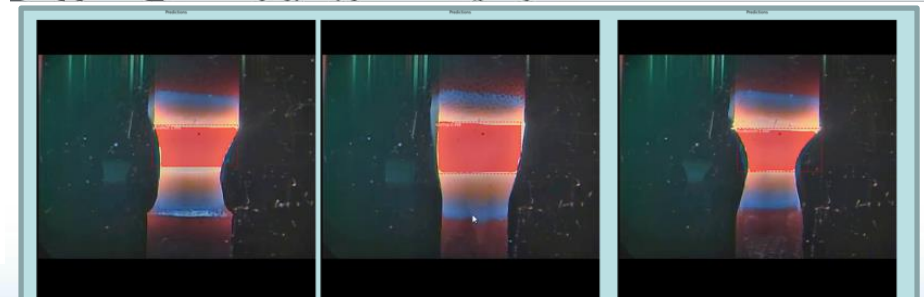
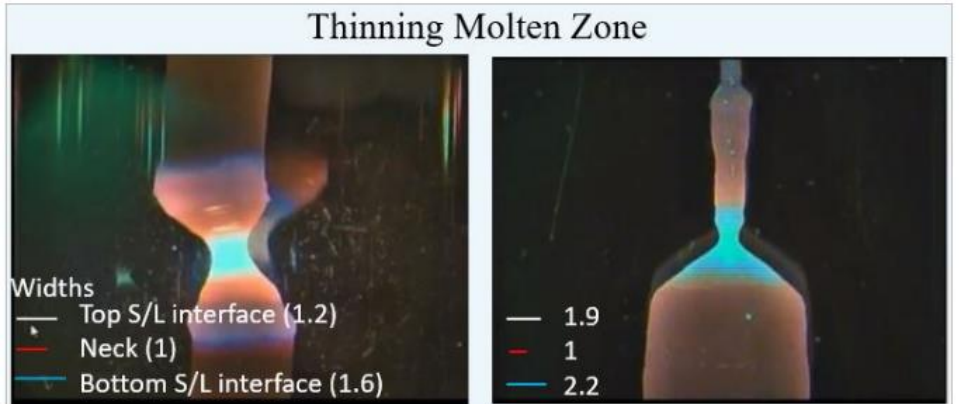
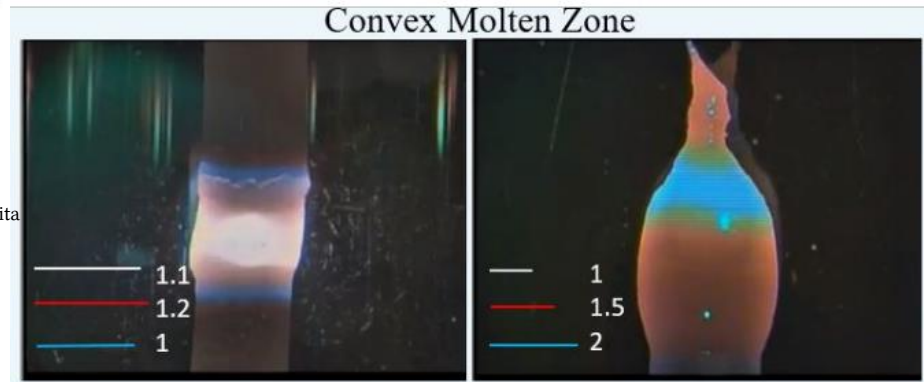
An Example



A, F: edge of top rod
B, G: top solid-liquid interface
C, H: "neck" of the molten zone
D, I: bottom solid liquid interface
E, J: edge of bottom rod



With Jessica Zahn, David Elbert, W. Adam Phelan, Nick Laurita



Real time identification and feedback

https://www.paradim.org/in-house_highlights/MIP_21



The Future

Directions for Materials Discovery

- Extensively automate routine processes
 - While preserving the ability for discovery by making unexpected observations
- Engender culture of archiving and publishing raw source data
 - Enable uses of data beyond that originally envisioned
- Great strides have been made in knowing what to make; now the challenge is: how do you make it?

Obstacles and Needs

- Experts with knowledge of data and materials domains to bridge the communities
 - Funding mechanisms that encourage this brand of cross-disciplinarity
- Cultural Inertia
- New infrastructure merging computing and materials design and discovery
- Mechanisms for giving and receiving appropriate credit