LBNL Fuel-Cell and Hydrogen Activities Overview

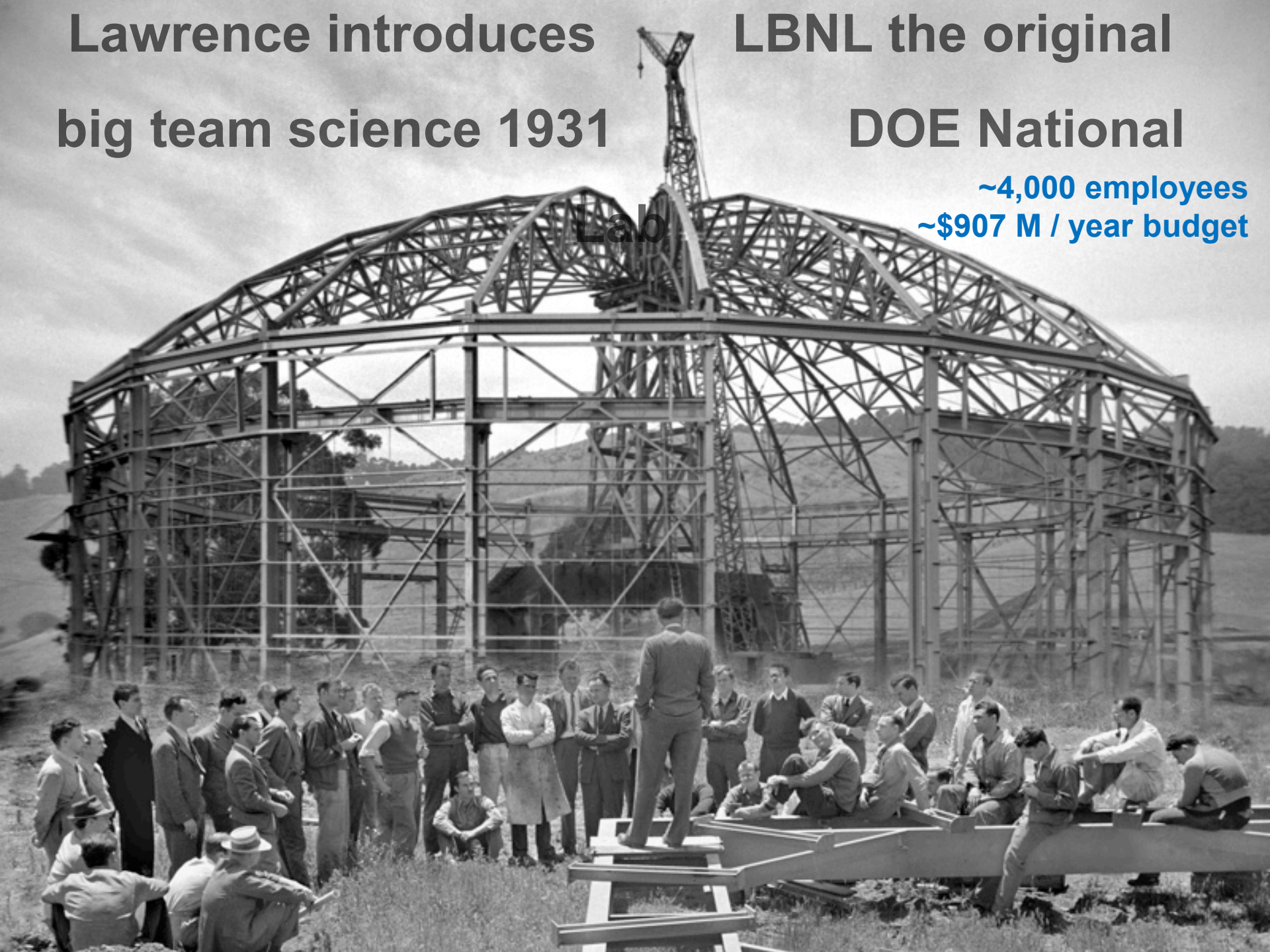
Adam Z. Weber

Staff Scientist
LBNL FCTO Program Manager

Lawrence introduces big team science 1931

LBNL the original DOE National Lab

~4,000 employees
~$907 M / year budget



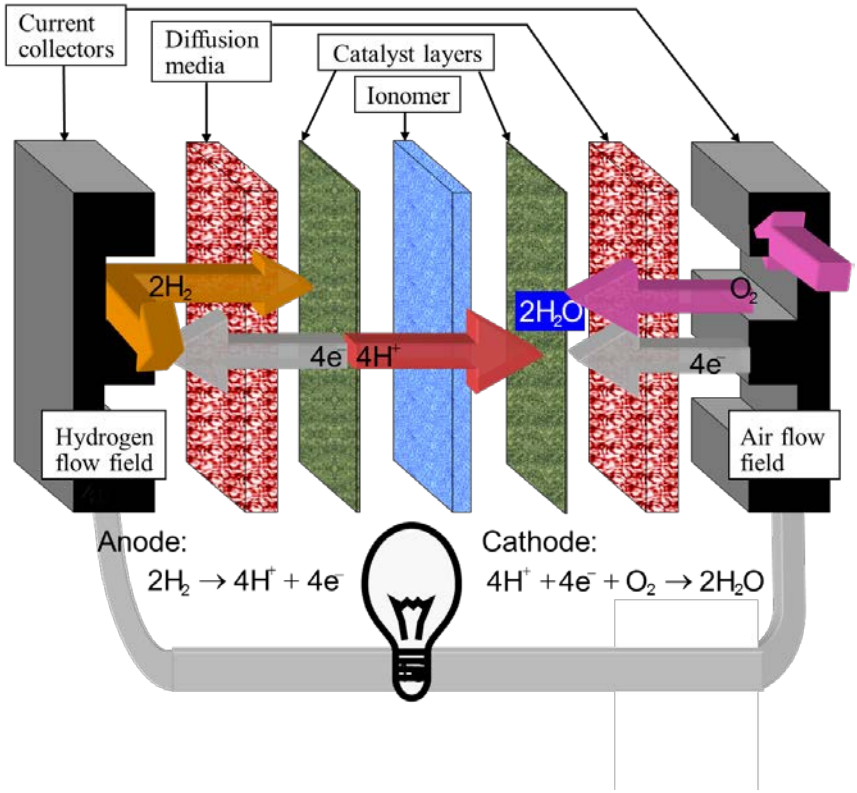
LBNL Overview

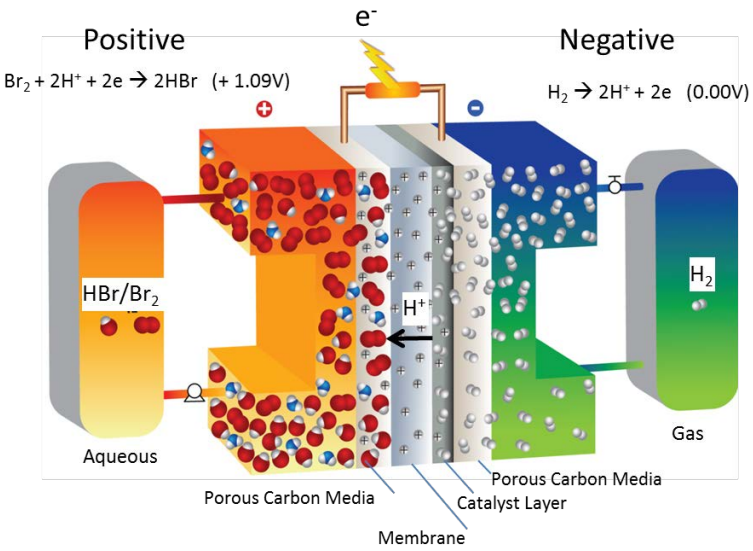
- **Core Capabilities**
  - Material Science
    - Molecular Foundry

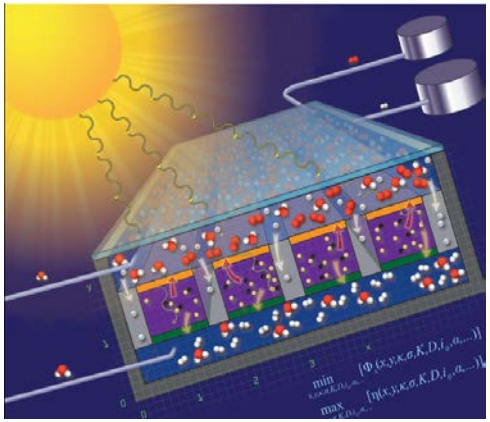
      National Center for Electron Microscopy
  - Synchrotron based research
    - Advanced Light Source (ALS)
  - Computing
    - National Energy Research Scientific Computing Center (NERSC)
    - Materials genome
  - Energy Efficiency and Energy Technologies
    - Batteries for Advanced Transport Technologies
    - Appliance Standards
  - Joint Center for Artificial Photosynthesis (JCAP)
  - Joint BioEnergy Institute (JBEI)
- **7 PIs/co-PIs and 15 staff researchers in hydrogen and fuel-cell RD&D**
  - Additional ~100 at JCAP

Technology Focus

- **Focus on deceasing cost and enabling technology**
  - Leverage across technologies using similar platforms
  - Increase performance and lifetime







Collaborators over past year

Industry

BALLARD
Freudenberg
GM
H2 Powered by 3M
ion Power, Inc customized Nafion® products
DUPONT
United Technologies Research Center
imagination at work
BOSCH Invented for life
TOYOTA
altergy systems

Academia

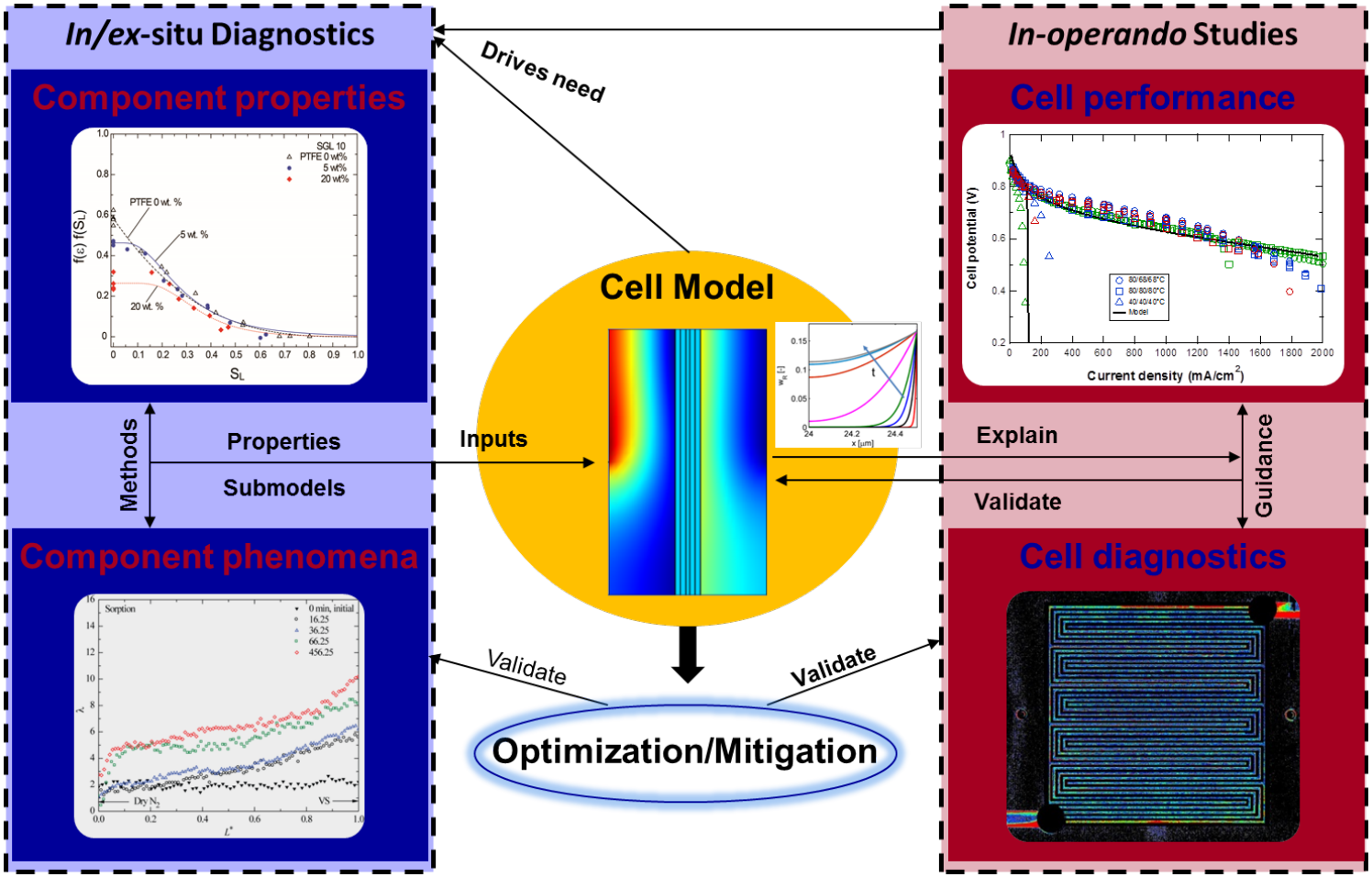
PENNSTATE 1855
UD
UNIVERSITY OF CALIFORNIA BERKELEY 1868
UNIVERSITY OF MICHIGAN
SCHOOL OF MINES 1874 COLORADO
UNIVERSITY OF CALGARY
MichiganTech
UNIVERSITY OF CALIFORNIA DAVIS
McGill
UT

Labs

NREL NATIONAL RENEWABLE ENERGY LABORATORY
NIST National Institute of Standards and Technology U.S. Department of Commerce
OAK RIDGE National Laboratory
Los Alamos NATIONAL LABORATORY EST.1943
PAUL SCHERRER INSTITUT PSI
Argonne NATIONAL LABORATORY

Capabilities

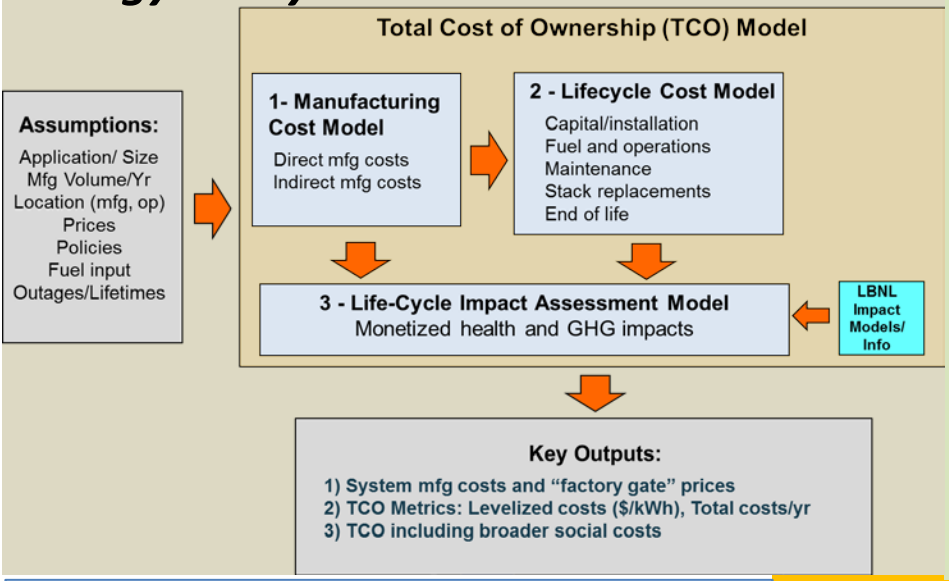
- **Relevant advanced diagnostic techniques coupled with physics-based modeling to enable performance optimization and durability mitigation**



http://www.bestar.lbl.gov/aweber
http://electrochem.lbl.gov/research-groups/weber-group

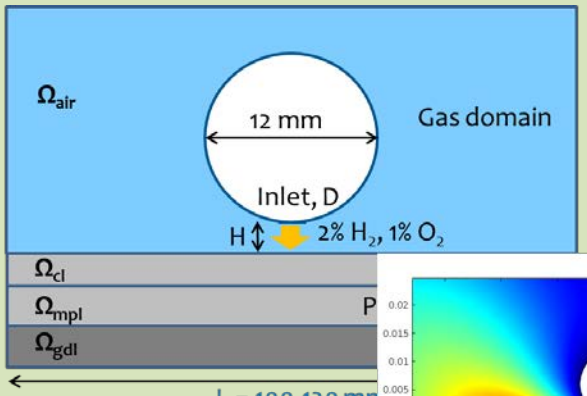
Capabilities

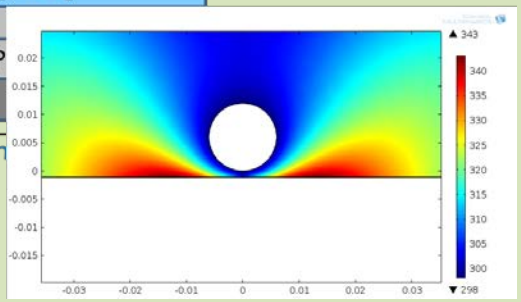
Energy Analysis



Manufacturing QC/QA

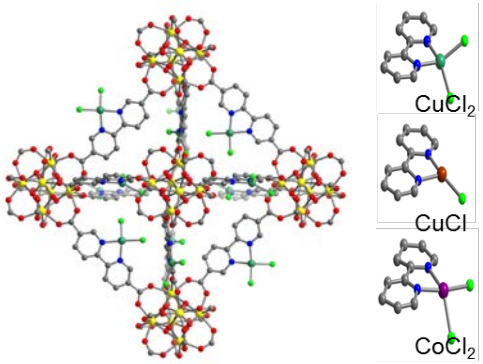
Modeling defect detection





Materials

MOFs for H_2 storage



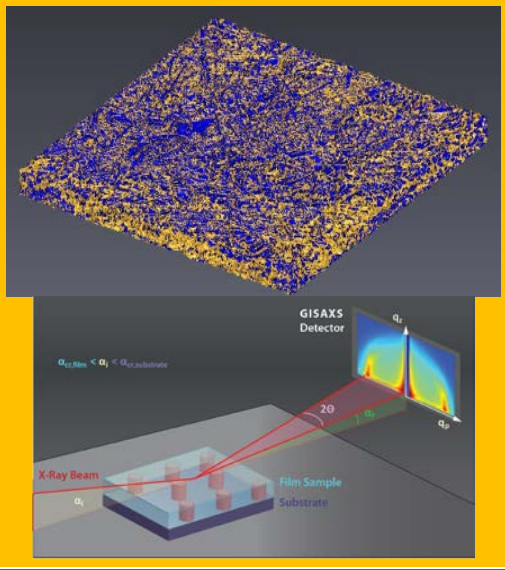
JCAP JOINT CENTER FOR ARTIFICIAL PHOTOSYNTHESIS

Facilities

NCEM NATIONAL CENTER FOR ELECTRON MICROSCOPY

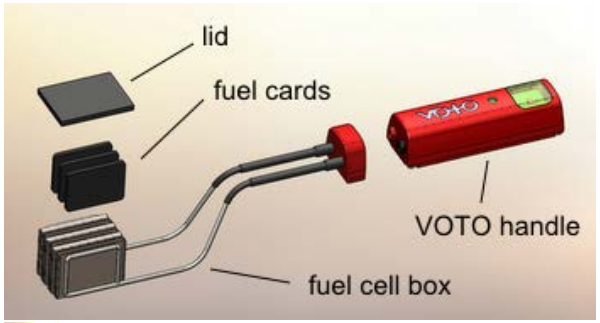
ALS Synchrotron Infrared Beamlines

Molecular Foundry



Technology Transfer

- **Proven technology to market and lab spinoffs**



- **TTO and STTR in 2014**
  - MEA structures for use of molecular catalysts
    - US Patent Application: 14/052,576

- **Novel, industry-friendly engagement mechanisms**

CalCharge

- **Recent scholarly recognition**

  - Presidential Early Career Award for Scientists and Engineers (PECASE)
  - Charles W. Tobias Young Investigator Award
  - American Chemical Society Inorganic Chemistry Lectureship Award

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