



U.S. ARMY
RDECOM

Center for Research in Extreme Batteries (CREB)



S&T Campaign: Materials Research
Energy & Power
Power Generation & Energy Harvesting

Cindy Lundgren
(301)-394-2541
cynthia.a.lundgren2.civ@mail.mil



Research Objective

- To foster and accelerate collaborative research in advanced battery materials and technologies and characterization techniques
- **Focus:** Batteries for extreme performance, environments and applications, for e.g. Defense, space and biomedical applications.
- **Participants:** Open to national and defense labs, universities, industry

Challenges

- Focus on extreme performance, environments and properties
- Scope is fundamental research to manufacturing
- Batteries used in extreme applications (flex electronics, munitions)
- Batteries with extreme properties (high energy, power density, extreme temps)
- Batteries performing in extreme environments (space, in vitro, oil wells)

Benefits

- Access to unique research solutions for defense, space, biomedical applications
- More effectively bring multiple disciplines together to engage in collaborative projects
- Access to people, unique research facilities and unique prototyping/manufacturing facilities
- Exposure to new ideas and collaborators
- Ability to formulate joint proposals and publications
- Early access to pre-competitive research results
- Technology Transition pathways available

ARL (Coordinator to Open Campus)
POC: Lundgren

ARL (Tech Lead)
electrolytes/interphases
POC: Xu

UMD (Tech Lead)
material science
POC: Wang (CRADA, CA)

NIST
Advanced characterization
POC: Jacobson

NRL
Porous carbon materials
POC: Long

NSWC
Battery capacitor hybrids
POC: Smith

NASA Goddard
Space battery applications
POC: Yi

JHU
Bioengineering and biotemplating
POC: Donohue

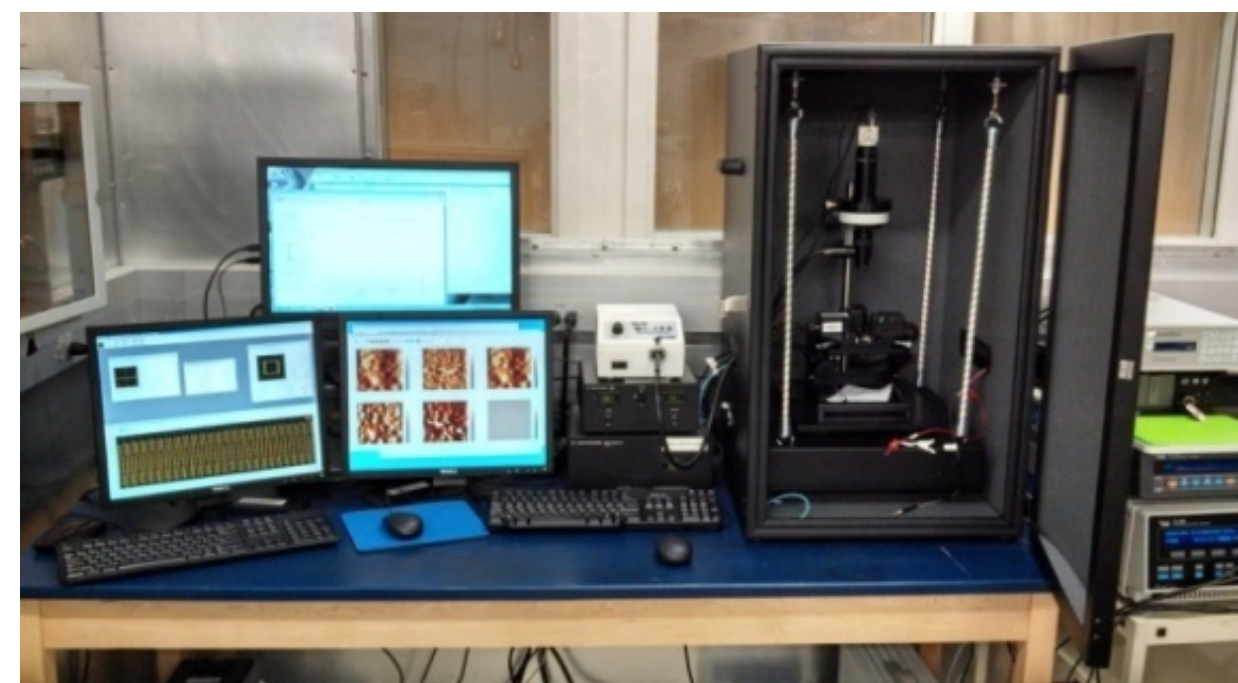
SAFT
Cell manufacturing
POC: Nechev (MTA)

DuPont
Material scale-up and process
POC: Kodokian

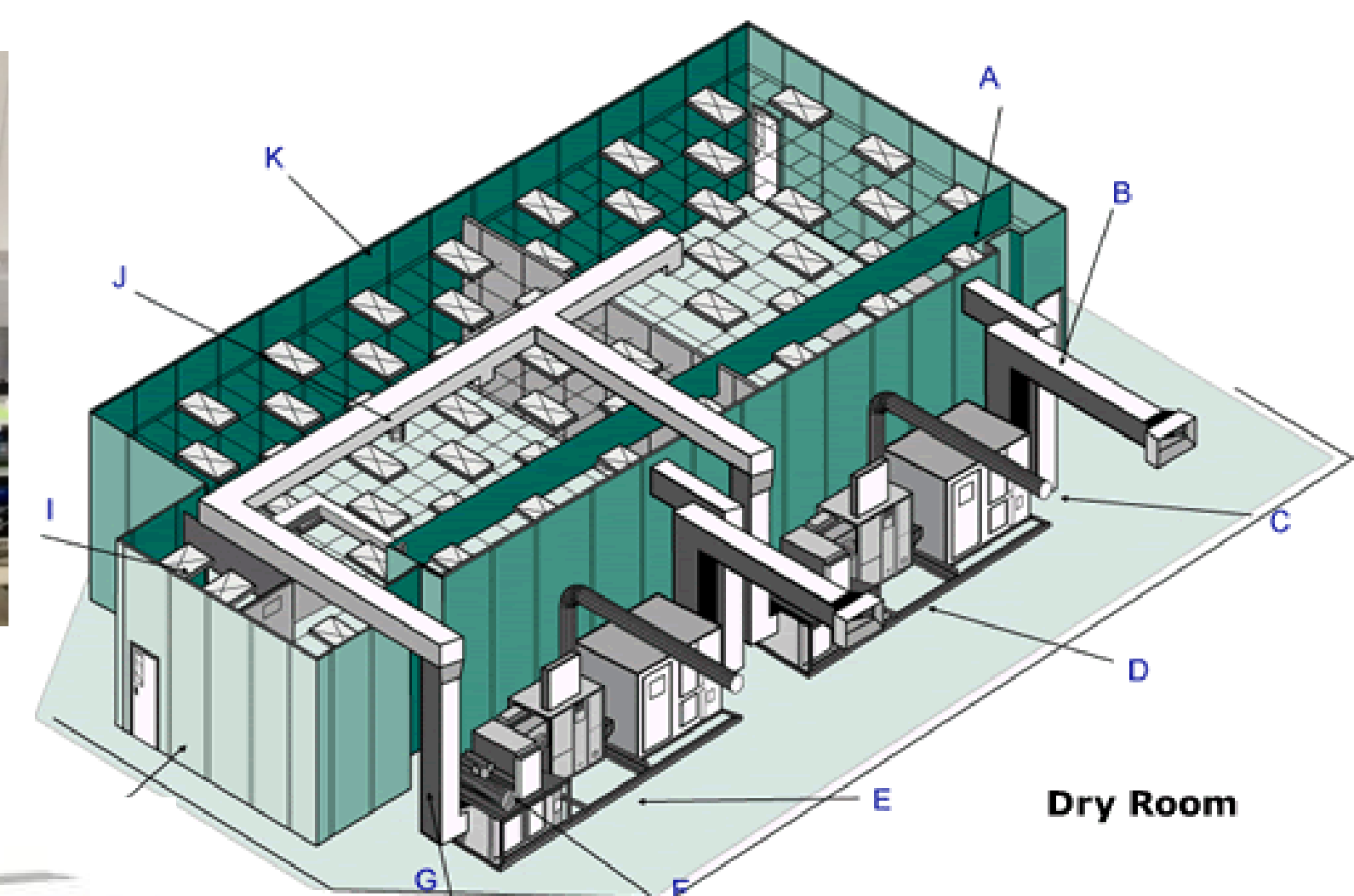
UMBC
Bio-engineering and biomineralization
POC: Allen

ARL Facilities and Capabilities Available to Support Collaborative Research

- 1800 ft² Dry Room
 - Airlock control on access
 - Chemical hoods for moisture-exclusion synthesis
- Wet lab adjoining Dry Room
- Class 100/10 Clean room
- X-ray Photoelectron Spectroscopy
- In situ Echem AFM/Raman
- In situ Echem XRD
- In situ Echem TEM
- In situ Echem IR
- Spin air gun



In-Situ AFM (dryroom)



Dry Room



In-Situ AFM / Raman (drybox)

Complementary Expertise / Facilities / Capabilities Sought in Collaboration

- Open participation
- No fixed duration or fixed funding source
- UMD/NIST/ARL have funded an initial cohort of postdocs that will work on CREB research as 1 year seed grants
- Focused on “Beyond Li-ion” battery chemistries for “extreme” applications
- Competitive solicitation released to UMD faculty who proposed collaborative joint projects with ARL and NIST scientists –winners have been announced
- The resulting collaborative research will fully integrate world leading battery scientists and world class facilities to advance battery science and technology