P/O/E/T/S

CENTER FOR POWER OPTIMIZATION OF ELECTRO-THERMAL SYSTEMS

# Materials Workshop Template

## 2022 Annual Meeting

October 18 – Noon to 2:00pm PDT

# Goals of Session

**Materials selection and development has been at the heart of POETS efforts since the start of the center; however, they take a significant amount of time to assess, develop and mature. This session will explore the development and integration of new materials and materials systems for electro-thermal power density improvements.**

## Outcomes:

- Review POETS active research in the area of materials over the last several years.
- Address some of the challenges and industry needs surrounding materials research.
- Identify focus areas of **fundamental research** and **enabling technologies** where POETS can contribute as we move forward

# Session Agenda

**Session Facilitated by Dr. Sonya Smith**

**Tasks for Technical Presentation**

- Provide high-level introduction of topic area
- Highlight current state of POETS research; including challenges
- Showcase specific projects that demonstrate POETS competency

- **20 Min – Industry Presentation**
  - TBD - Working with NASA Ames
- **60 Min – Technology Presentations**
  - **15 Min** - Materials enabling higher heat fluxes for components with the goal of improved thermal management. (**Dr. Ashegi**)
  - **15 Min** - Novel materials and approaches for high power and energy density thermal energy storage (**Dr. Miljkovic/Dr. Braun/Dr. Lyding**)
  - **15 Min** - Nitride materials in power electronics (**Dr. Stillwell)**
  - **15 Min** - Cryogenics for conventional systems and for superconductivity - (**Dr. Haran, Dr. Mantooth**)
- **40 Min - Guided discussion**
  - Challenges and needs regarding materials and how POETS can contribute. Group encouraged to rank and stack ideas to ensure POETS is focusing on highest need objectives.

# Topic Slides

Faculty – Please insert your slides here and return to Owen by **Monday, October 17** for placement into the overall slide deck.

**For Information Only**

**Tasks for Technical Presentation**

- Provide high-level introduction of topic area
- Highlight current state of POETS research; including challenges
- Showcase specific projects that demonstrate POETS competency

**Audience**

- POETS' Industry Reps – multi-disciplines
- POETS' Faculty
- POETS' Students

**Support**

- If you want to include graphics or information on a POETS project in your topic area that is not your project, let Owen know and he can pull that information.
- If you have some papers or documents you would like to provide the IAB/Students to help with technical backgrounds, please provide them to Owen and he will disseminate prior to event.

Not including Battery Chemistry

Superconducting cables

Continue to look for 1st, 2nd, 3rd, tier suppliers

# Discussion

Simulating material impacts at the system level

Materials for High Heat Flux

Novel Materials/methods for Thermal Management

- PCM
- Additive manufacturing for heat sinks

Nitride Materials for Power Electronics

- GAN

Superconductors

- Cryocooler
- Power electronics
- Cables

Battery Modeling Lifecycle (Industry)

Battery Weight/Heat – Material Solutions

High Temperature Capacitors and Inductors

Improving energy storage (general)

Taking advantage of SiC fab capabilities