

### DOE Battery and Long-Duration Storage Shot Support

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## Energy Storage Activities Throughout DOE





## Basic Energy Sciences (BES): Understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels

- Supports basic research to discover new materials and design new chemical processes that underpin a broad range of energy technologies
  - Critical role in clean energy research, including energy storage
- Operates and maintains world-class scientific user facilities for x-ray, neutron, and electron beam scattering as well as in nanoscale research
  - Capabilities broadly used for synthesis, characterization, and computational modeling for energy storage



# Fundamental Research is Supported in Each of the Major BES Research Modalities

#### **Core Research**

Fundamental materials & chemical sciences research. Supports single investigators (~\$150K+/year) & small groups (\$500K-\$2M/yr, 3-yr).

#### Energy Frontier & Energy Earthshot Research Centers, Computational Science Centers

Fundamental, use-inspired research per Basic Research Needs Workshop reports. Supports larger teams (\$2-5M/yr, 4-yr).

#### Energy Storage & Fuels from Sunlight Energy Innovation Hubs; Quantum Information Sciences Centers

Fundamental research on topics that have proven challenging for traditional funding modalities. Large-team research awards (\$8-25M/yr, 5-yr). Have defined research goals, milestones, and management.



## SC Energy Earthshot Initiative – FY 2023 Start

#### Energy Earthshots Research Centers (EERCs)

**Center-scale projects** to provide scientific foundations for DOE Energy Earthshots' goals

Addresses a **single** DOE Energy Earthshot

#### Lead institution must be DOE National Lab

Partners may include universities, industry, and other National Labs

#### Science Foundations for Energy Earthshots (SFEEs)

- Small team projects to provide scientific foundations for DOE Energy Earthshots' goals
- Can address <u>multiple</u> DOE Energy Earthshots
- Lead institution must be a university
  - Partners may include DOE National Labs, industry, and other universities

4-year awards; \$1-5M/year

- 3-year awards; \$2-5M/award
- Address key research challenges at the interface between SC-supported fundamental research and applied R&D activities supported by DOE technology offices
- Projects can span multiple offices (ASCR, BES, BER)



Energy.gov/science

## Long Duration Storage Shot Relevant Awards



**Degradation Reactions in Electrothermal Energy Storage** (DEGREES), Judith Vidal (NREL) with BNL, ANL, UT Dallas, Georgia Tech, Auburn, Stony Brook

 Advance fundamental understanding of degradation of highlyenergetic thermal energy storage materials used for long-duration energy storage in support of a future-ready decarbonized grid.

**Center for Strain Optimization for Renewable Energy (STORE),** Sarah Tolbert (UCLA) with CalTech, SLAC, UC Santa Barbara, USoCal

 Develop methods to mitigate and manage structure and volume change upon Na<sup>+</sup> insertion in electrochemical energy storage materials

Understanding Thermo-Chemo-Mechanical Transformations in Thermal Energy Storage Materials and Composites, Akanksha Krishnakumar Menon (GeorgiaTech) with LBNL

 Study how material composition, structure, and mechanical stress co-evolve in thermal energy storage materials to develop new materials that maximize storage capacity and minimize degradation.



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