

2014 ARPA-E Energy Innovation Summit

Showcase Submission Information Template

Use this template to prepare your answers for the online Technology Showcase Submission Form. Required fields are identified below with a red asterisk. (*)

Important!

If you are an **ARPA-E awardee directly receiving funding from ARPA-E**, you will be invited to participate, please do **NOT** complete the online application. You will receive an email from the Technology Forums team including your ARPA-E project control number. If you are a subcontractor or prior ARPA-E Awardee, you may complete the application.

Primary Applicant Information

(You will be prompted to enter the information in title case (uppercase and lowercase))

- *First Name: Tina
- *Last Name: Nenoff
- Suffix:
- Rank/Title:
- *Organization: 1114
- Division/Branch:
- *Job Title: Distinguished Member of Technical Staff
- *Address (City, State, Zip/Postal Code): Sandia National Laboratories, PO Box 5800, MS 1415, Albuquerque, NM 87185
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Submission Details

- * Title: Binder-free pelletization for porous molecular sieves, clays and metal-organic frameworks (MOFs), for applications in gas or ion selectivity.

Additional Details

- *Select Category
 - Lead Awardee (STOP – do not complete this application)
 - ARPA-E Awardee Subcontractor
 - ARPA-E Alumni
 - **None of the above**

- ***Technology Summary:** Describe the technology you are developing and how it works. (200 word max)

This is a binder-free pelletization process allows for the processing of crystalline powder, porous oxide materials into industrially relevant pellet shaped pieces with no reduction in sorption capacity or accessible surface area of the porous oxide material. This technology is successful with a wide range of sorptive and catalytic materials, such as zeolites, molecular sieves, clays, and MOFs The shape of the formed pellet can be varied to address the needs of the target engineered system. Because there is no binder, 100% of the relevant properties of the material are retained and accessible, resulting in no diminished performance. The final pellet is as chemically, mechanically and thermally durable as the original porous phase. As such, it can be later processed as the original powder, such as back flushed of sorbed molecule, regenerated for catalysis, or incorporated into a glass for a nuclear waste form. It has been successfully implemented

- ***Transformational Merit:** What is transformational about this technology? How is it different from existing technologies? (200 word max)

Novel materials for industrial applications in separations and catalysis are being developed worldwide. However, implementation of those materials into industrial relevant, pre-existing, and environmentally conscious ways requires the transformation of the materials into useable forms. Catalysts and separations materials made of crystalline porous metal oxides (eg., zeolites, clays, MOFs) need to maintain their surface area and their reactivity under industrial process temperatures and pressures. However they also must retain their physical integrity during multiple industrial cycles. If fabricated as high static powders, their morphology will negatively impact the industrial process by clogging flow or flowing in the gas/liquid streams. Pelletization is key to transforming the morphology to a usable form. Generally pelletization requires binders that bind the oxide crystallites into a form. Our technology uses a binderless technology process to form shapes and sizes of interest with no loss of oxide surface area (to maintain reactivity) or sorption capacity (to maintain volume processed). This is essential to high process productivity and can be successful in a range of industries including: chemical processing, petrochemical processing and catalysis, gas separations, and nuclear waste remediation

- ***Next Steps:** List technical challenges, developmental milestones, and/or other next steps needed to get this technology into the market. (200 word max)

This technology has been proven in the laboratory and in pilot-scale gas sorption studies. However, the remaining milestones to introduce this technology to the market include producing a cost competitive process and an industrially scaled up procedure.

- ***Public Summary:** Please provide a Technology Summary to be published on the conference website and in the printed program guide. (100 word max)

We introduce a binder-free pelletization process for the fabrication of industrially relevant pellets of porous catalysts and separations materials. This process enables the industrial implementation of known and novel oxide based materials into industrial processes with full access to surface area and reactivity of the base material, which maintaining chemical, mechanical and thermal stability. Furthermore, pelletization eliminates the environmental concerns of dust or degradation of the material in the industrial stream.

- ***Developmental Status** (Choose one from drop-down menu)
 - Technology Prototype
 - Proof of Concept
 - **Product Prototype**
 - Pilot-Scale Prototype
 - Full-Scale Prototype
- ***Application Area:** (Choose one from drop-down menu)
 - Advance Fuels
 - Advanced Magnets
 - Building Efficiency
 - Carbon Capture Utilization
 - Control Systems
 - Electricity Transmission & Distribution
 - Energy Storage, Portable
 - Energy Storage, Stationary
 - Industrial Efficiency
 - Renewable Power Generation
 - Thermal Energy Utilization
 - Traditional Power Generation
 - Vehicle Technologies
 - Water

- **Other**
 - If other – Industrial Gas or Ion Separations
- Website URL: <https://ip.sandia.gov/technology.do/techID=26>
- Organization Size (Choose one from drop-down menu)
 - 1-15
 - 16-99
 - 100-499
 - 500-2499
 - **2500+**
- *Have you participated in the Showcase before? **Yes** or No
- **If yes, what years did you participate?**
- **From who did you hear about this opportunity? (Choose one from drop-down menu)**
 - Other Organization
 - ACCT Canada
 - Advanced Energy Economy (AEE)
 - American Council on Renewable Energy (ACORE)
 - American Energy Innovation Council
 - American Public Power Association
 - ARPA-E Promotion (email, business card, etc.)
 - ARPA-E Program Director
 - Biotechnology Industry Association (BIO)
 - CALSTART
 - Center for Science Policy and Outcomes
 - Chambers for Innovation and Clean Energy (CICE)
 - Clean Edge
 - Clean Energy Trust
 - Cleantech Open
 - Collegiate Energy Association
 - Colorado Cleantech Industry Association
 - DEED
 - Earth Techling
 - Electricity Storage Association (ESA)
 - Environmental Entrepreneurs (E2)
 - Fuel Cell and Hydrogen Energy Association
 - GUIRR
 - Gas Turbine Association
 - Government Executive Media Group
 - GreenTech Media
 - IEE

- Information Technology and Innovation Foundation (ITIF)
- International Green Energy Council
- Licensing Executives Society
- MIT Technology Review
- NVCA
- National Hydropower Association
- New England Clean Energy Council
- N/A
- Northeast Sustainable Energy Association (NESEA)
- Pike Research
- Prescience International's Environmental Business Cluster (EBC)
- Scientific American
- U.S. Energy Association (USEA)
- UIDP
- **Booth Features (Check all that apply)**
 - Live Demo
 - Oversized or Special Items that Might Require Accommodation
 - Prototype
 - Video
 - Slideshow
 - Posters
 - Banners or Large Signage
 - Other
 - No Information at this Time
- ***Keyword:** Enter a number of keywords separated by commas that will help attendees find your organization and technology.

Pelletization, binder-free, zeolites, MOFs, clays, molecular sieves, mechanically durable, maintain surface area and reactivity