

# TechBriefs

## Savannah River National Laboratory

U.S. DEPARTMENT OF ENERGY • SAVANNAH RIVER SITE • AIKEN • SC

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### Benefits

- > Efficient storage of hydrogen isotopes
- > Controlled and targeted release of hydrogen
- > Selective release of hydrogen isotopes
- > High storage density
- > Safe storage of hydrogen

### Applications

- > Hydrogen isotopes separation and storage
- > Rechargeable batteries
- > Hydrogen absorption chillers

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## Controlled Release of Hydrogen Isotopes from Composite Nanomaterials

### Technology Overview

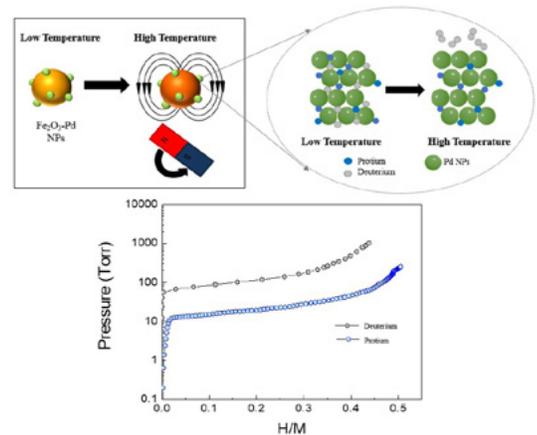
Savannah River National Laboratory (SRNL) has developed a library of novel nanoscale materials for targeted, reversible, high capacity hydrogen isotope separation and storage. These multifunctional nanomaterials combine a high-efficiency hydrogen absorbing material with a non-contact energy absorbing material in a composite nanoparticle.

### Description

SRNL has discovered a class of multi-functional nanomaterials for hydrogen isotope storage, separation, and controlled release. This invention includes a bed of composite nanoparticles and an energy source configured for non-contact delivery of energy to the magnetic or plasmonic material via an alternating magnetic field or electromagnetic wave. The system can also include a hydrogen source upstream of the bed and/or a hydrogen collection or combustion facility downstream of the bed. The rate of hydrogen isotope release and/or the amount of hydrogen isotope released from the absorbing material can be tailored based upon the magnetic field strength applied or the wavelength of the energy source used. These systems are simple, viable and straightforward to implement and can replace existing bulky and operational complex systems such as hot/cold nitrogen or electric heaters. With a very small footprint this technology provide a safer method of handling radioactive materials, e.g. tritium.

### Intellectual Property

This technology and methods for its use have been granted U.S. Patent No. 10,507,542 B2 (December 17, 2019), "Controlled Release of Hydrogen from Composite Nanoparticles" and is available for licensing.



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### Technology transfer

The Savannah River National Laboratory (SRNL) is the U.S. Department of Energy's (DOE) applied research and development laboratory at the Savannah River Site (SRS).

With its wide spectrum of expertise in areas such as homeland security, hydrogen technology, materials, sensors, and environmental science, SRNL's cutting edge technology delivers high dividends to its customers.

The management and operating contractor for SRS and SRNL is Savannah River Nuclear Solutions, LLC. SRNS is responsible for transferring its technologies to the private sector so that these technologies may have the collateral benefit of enhancing U.S. economic competitiveness.

### Partnering opportunities

SRNS invites interested companies with proven capabilities in this area of expertise to develop commercial applications for this process under a cooperative research and development agreement (CRADA) or licensing agreement. Interested companies will be requested to submit a business plan setting forth company qualifications, strategies, activities, and milestones for commercializing this invention. Qualifications should include past experience at bringing similar products to market, reasonable schedule for product launch, sufficient manufacturing capacity, established distribution networks, and evidence of sufficient financial resources for product development and launch.

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