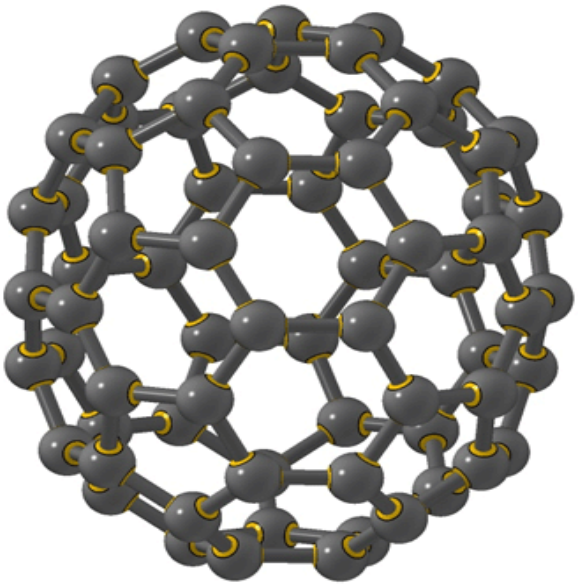
SRNL SAVANNAH RIVER NATIONAL LABORATORY

techbriefs

High Capacity Hydrogen Storage Nanocomposite



Scientists at The Savannah River National Laboratory's (SRNL) Hydrogen Research Center have developed new processes to add metal hydrides to nanocarbon structures to yield high capacity hydrogen storage materials. Testing of these materials has shown that hydrogen can be efficiently absorbed and released in multiple cycles and in significant quantities. Processes to add Lithium Hydride to Fullerenes have resulted in structures that can retain and release significant quantities of hydrogen at lower temperatures and pressure.

Background

Hydrofullerenes ($C_{60}H_{60}$) are theoretical capacity of 7.7 weight percent Hydrogen. Previous attempts to load hydrogen to a fullerene structure have been at 6 weight percent. A disadvantage to hydrofullerenes is that it requires temperatures in excess of 500 degrees Celsius to desorb the hydrogen with damage to the fullerene structure. Scientists at SRNL have developed new processes using metal hydrides to develop materials where the hydrogen can be absorbed and released with greater efficiency.

at a glance

- **H_2 absorption/desorption at 5.0 weight percent**
- **significant quantities of H_2 at lower temp and pressure**
- **storage is reversible**
- **patent pending**

SRNL-L5210-2011-00147

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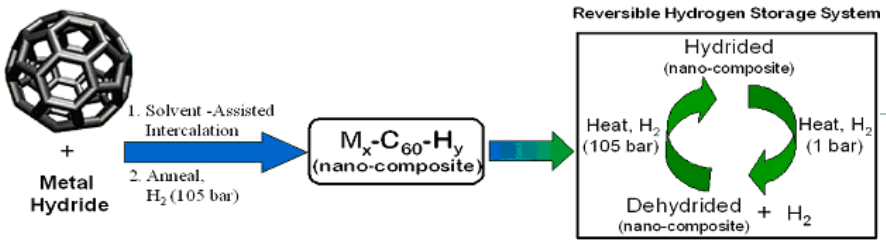
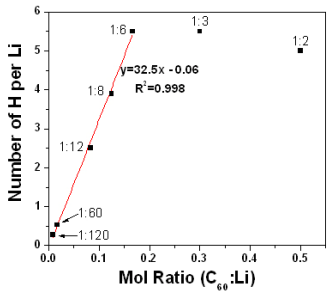
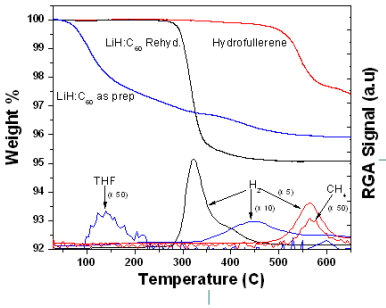
High Capacity Hydrogen Storage Nanocomposite





Plot of Number of hydrogen atoms per lithium atom vs The mol ratio of C_{60}:Li. An ratio of 1:6 (C_{60}:Li) achieved the highest H_2 capacity (5.0%).



TGA-RGA comparison of the 3rd desorption Of the LiH:C_{60} (6:1) composite (as prepared-blue and Rehydrided-black) and hydrofullerene (red). The materials were hydrogenated at 350°C under 105 bar H_2.

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 and 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 or product under a cooperative research and development agreement 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.

for more information

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