Researchers develop new hydrogen storage technology

February 14 2011

(PhysOrg.com) -- Working with scientists from the STFC's Rutherford Appleton Laboratory and the University of Oxford, LCN researchers Zeynep Kurban and Professor Neal Skipper and UCL graduate Dr Arthur Lovell have developed a new technology that allows hydrogen to be stored in a cheap and practical way, making it promising for widespread use as a carbon-free alternative to petrol.

The team have developed a new nano-structuring technique called 'co-electrospinning' to produce tiny plastic micro-fibres 30 times smaller than a human hair. These hollow micro-fibres have then been used to encapsulate hydrogen-rich chemicals known as hydrides, in a way that allows the hydrogen to be released at much faster rates and at lower temperatures than was previously possible. The encapsulation also protects the hydrides from oxygen and water, prolonging their life and making it possible to handle them safely in air.

This new nano-material contains as much hydrogen for a given weight as the high pressure tanks currently used in prototype hydrogen vehicles, and can also be made in the form of micro beads that can be poured and pumped like a liquid. These properties mean that the beads could be used to fill up tanks in cars and aeroplanes in a very similar way to current fuels, but crucially without producing the carbon emissions. This technology underpins the new spin-out company Cella Energy Ltd, which is based at the Harwell Science and Innovation Campus, Oxfordshire.

UCL doctoral student Zeynep Kurban (pictured), who played a key role in the scientific development while studying for her EngD in Molecular Modeling and Materials Science, said: “This new technology provides solutions to some of the key issues surrounding hydrogen storage systems, bringing us a step closer to commercialisation of these materials for clean energy applications.”

The lead A round investor in Cella Energy is Thomas Swan & Co. Ltd., a specialist UK chemical company established in 1926. Thomas Swan’s Advanced Materials Division is dedicated to the development of high specification materials for emerging technologies with particular focus on carbon nanomaterials and advanced coatings. Shareholders also include STFC Innovations Ltd, UCL Business PLC and the Chancellor, Masters and Scholars of the University of Oxford.

Dr Tim Fishlock, Business Manager at UCL Business said: “Cella Energy is capitalising on an innovative technology developed within the research labs of three world class research centres at RAL, UCL and Oxford, which brings the large scale adoption of hydrogen powered vehicles closer to reality. Thomas Swan & Co is a fantastic partner for Cella Energy and wish the team every success with their future plans.”

More information: Academic paper: A Solution Selection Model for Coaxial Electrospinning and its Application to Nanostructured Hydrogen Storage Materials

Provided by University College London