

Nano-Structured Hybrid Hydrogen Storage Materials for Small Scale Energy Supply Technologies- Grant Awarded £341,256

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Summary

The general objective of the project is to develop a material that will reversibly absorb hydrogen at a high density by a mixture of physisorption and chemisorption, probably at liquid nitrogen temperatures. This store will be an efficient way of storing energy locally. The hydrogen can be delivered by pipeline or liquid hydrogen tanker or can be generated by electrolysis. It can then be converted back to energy in a fuel cell, either as part of a CHP scheme or as a back-up power supply for eg a hospital.

In detail the objectives are:

1. To Produce a Hybrid Physisorption/Chemisorption Hydrogen Storage System: We will not initially strive for maximum possible gravimetric storage, but will start with hydride materials that have been investigated in the bulk in other projects we were involved in.
2. To establish the performance characterisation of the material under engineering conditions: Parameterisation of performance, in particular to establish that the material will give fast adsorption/desorption of hydrogen over many cycles with no tendency for the nano-particles to sinter, recrystallise or coalescence
3. To design, construct and evaluate a prototype flat-plate storage vessel: Absorption/desorption process will be investigated by direct neutron radiography, thermography and neutron strain scanning.
4. To undertake up-scaling and technology transfer to NW industry: IPR protection and commercial exploitation is central to this work. The prototype material will be directly evaluated in the construction of a hydrogen tank.