

Project HC-15: Performance characterisation of solid-state hydrogen storage materials

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Background

The Institute for Energy (IE) of the European Commission (EC) -Joint Research Centre (JRC) provides scientific and technical support for the conception, development, implementation and monitoring of community policies related to energy. Special emphasis is given to the security of energy supply and sustainable and safe energy production. The Clean Energies Unit (CEU) of the Institute will actively participate in Task 17, starting in 2004. This effort aims at the uptake and diffusion of safer and cleaner energy technologies for sustainable development and acts as the EC in-house reference point on selected energy technology issues. The Unit activities cover the storage and distribution of alternative fuels, with special emphasis on hydrogen. The CEU strongly supports codes drafting and standardisation, through its multi-annual work programme and the development of reference laboratory installations on standardised testing procedures of safe alternative fuels storage and distribution systems. The CEU has recently organised, under the umbrella of the JRC Enlargement action, a training Workshop on safety, efficiency and performance of innovative hydrogen storage technologies for road transport and especially addressed to young researchers from EU Enlargement countries.

Planned Task 17 Activity in 2004

Our proposed contribution to Task 17 aims at assessing, validating and benchmarking performance, efficiency, reliability, safety and environmental compliance of hydrogen solid-state storage technologies. Our involvement will be experimental and focused on the performance characterisation of the hydrogen storage capacity of solid-state materials (metal hydrides and carbonaceous materials). We have at our disposal, dedicated hydrogen storage testing facilities that include:

- A Gas Reaction Controller, which is a fully automated volumetric Pressure-Composition-Temperature measurement system (PCT Unit): in operation
- An Intelligent Gravimetric Analyser (IGA Unit): to be installed in January 2004.
- A Temperature Programmed Reduction/Reaction Spectroscopy (TPRS Unit): to be purchased early 2004 with a planned operation by September 2004.

The first two testing capabilities include dynamic, pressure-composition-isotherms and cycling measurements in order to assess the performance characteristics and the life-cycle stability of the targeted materials as hydrogen storage media. The TPRS Unit will be used to study surface reactions and molecular adsorption on surfaces to discriminate between processes with different activation parameters.