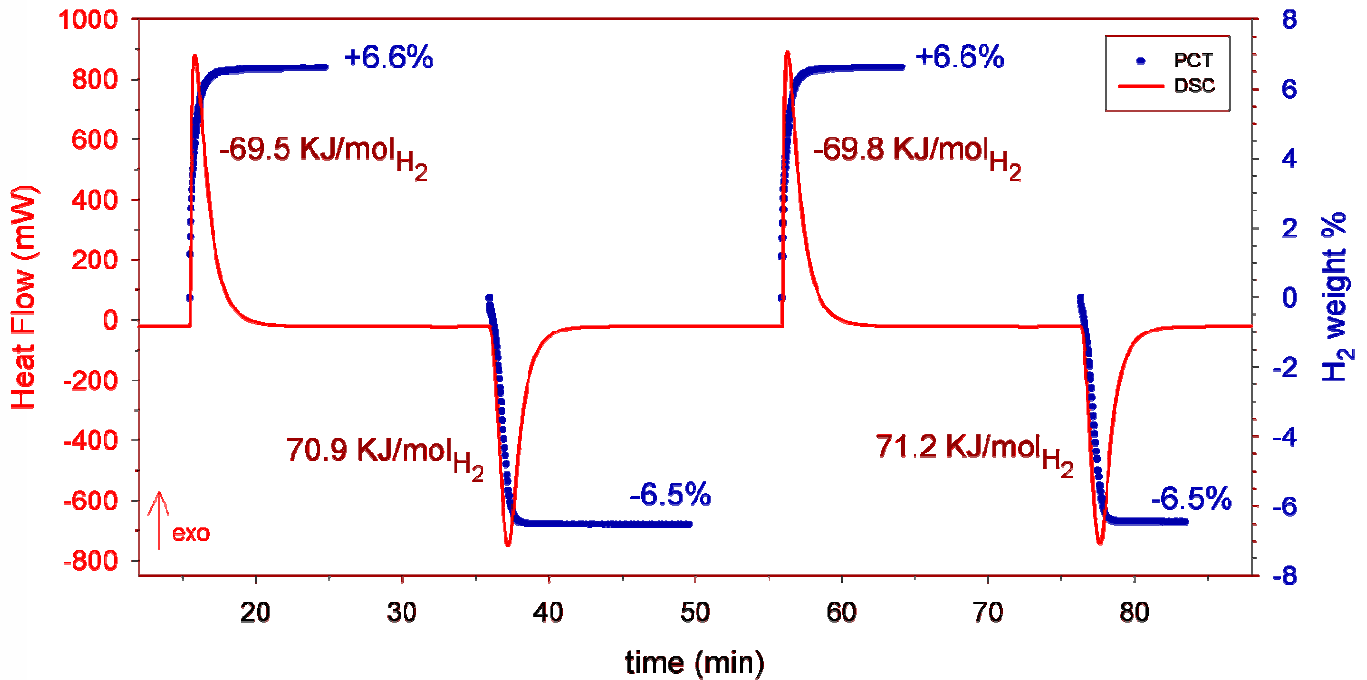


Combined calorimetric and sorption measurements on Mg-based hydride with small sample mass

Introduction: The thermodynamic stability of hydrides is key to practical applications in hydrogen storage. As shown in AN622, we can quantify both the heat of formation of the hydride and its hydrogen sorption capacity. In this example, we demonstrate the capability to make combined calorimetry and sorption measurements on a very small (34mg) sample using the HP cell of a Sensys coupled with a PCTPro-2000.



Hydrogen adsorption/desorption cycles for Mg-C-Nb₂O₅ at 350 °C

Experimental

The reaction of hydrogen with 34 mg of a Mg-C-Nb₂O₅ composite was characterized by:

- PCT measurements to determine the hydrogen uptake,
- calorimetric measurements to study heats of reaction.

The sample was subjected to a series of absorption/desorption cycles. The hydrogen absorption was started at 12 bar, and the desorption was carried out at 1 bar.

Results

We have shown that the absorption reaction is fully reversible and that both the enthalpy and hydrogen uptake are reproducible throughout the cycles.

This example demonstrates that sorption studies on small quantities of samples can be investigated by this unique coupling of the Sensys HP-DSC and PCTPro-2000.

Instrument

PCTPro-2000
Gas sorption
Sievert's
instrument
-260 to 500°C



Instrument

Sensys HP DSC
Calvet 3D DSC
Up to 600°C
400 bar



Results provided courtesy of the University of Pavia

