

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

INTRODUCTION

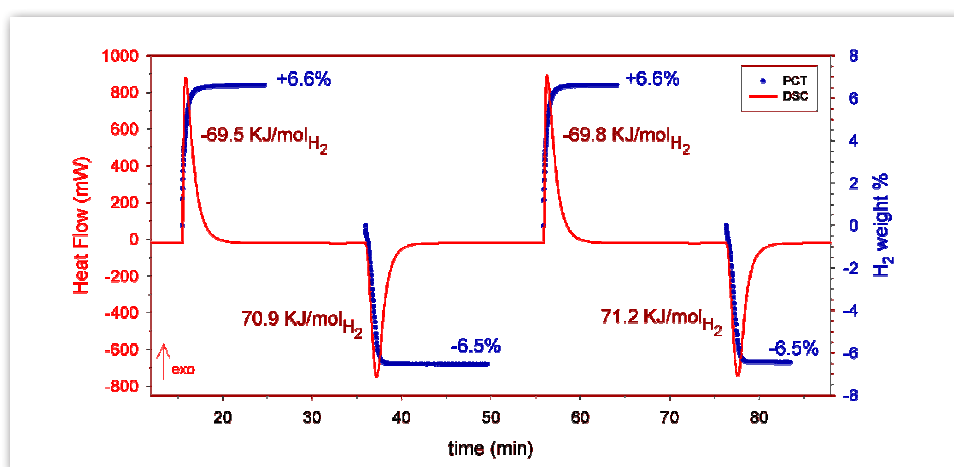
The thermodynamic stability of hydrides is key to practical applications in hydrogen storage. As shown in AN622, we can quantify both the heat of formation of the hydride and its hydrogen sorption capacity. In this example, we demonstrate the capability to make combined calorimetry and sorption measurements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

EXPERIMENT

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.



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

RESULTS AND CONCLUSION

We have shown that the absorption reaction is fully reversible and that both the enthalpy and the 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 CALVET PRO DSC and GASPRO.

INSTRUMENT

GASPRO

-260°C to 500°C



VARIETY OF MODES OF OPERATION

ability to combine PCT, kinetics and cycle life modes to 200bar to determine the quantity and rate of sample gas interaction and its aging characteristics all in one instrument and operation

PRECISION MEASUREMENT OF SMALL SAMPLES

using the patented microdoser option to inject small doses of gas on the sample

HIGH ACCURACY VERSION

to reduce cumulative error across multiple measurements points

EXTERNAL CALORIMETER COUPLING CAPABILITY

to increase your research options