

DSC analysis of a phase change materials at very slow scan rate

INTRODUCTION

Phase change materials (PCM) are substances with high heats of fusion which can store or release large amounts of energy while melting or solidifying. Therefore, they are employed, for example, in thermal energy storage, active insulation, improved air conditioning systems, or, off peak power utilization...

It is a key factor to be able to accurately determine the variation of enthalpy of the materials, for example using the calculation of the integral of the heat capacity measured by DSC. However, in order to approach the real thermal behavior, a very slow scan rate is necessary during DSC analyses.

EXPERIMENT

The tested sample is an organic material under the form of a soft and translucent band. In order to determine its Cp, approximately 400 mg of material was introduced into the measuring cell.

Experiments were conducted on a MICROCALVET ULTRA at a scan rate of 0.05K/min between 35°C and -20°C, then between -20°C and 35°C. Moreover, a blank test was realized in the same condition.

RESULTS AND CONCLUSION

The analyses realized show the capacity of the MICROCALVET ULTRA to make measurements of heats of transformation (melting or crystallization) during heating and cooling. Moreover, thanks to its great sensitivity, measurements can be carried out at a very low scan rate what allows, first of all, to approach, as well as possible, the real conditions of use of materials (0.05K/min = 3K/h) and also to observe phenomena with slow kinetics.

INSTRUMENT

MICROCALVET ULTRA

-20 to 170°C



HIGHEST HEAT MEASUREMENT ACCURACY

3D sensor based on Peltier elements with Joule effect calibration.

MODIFIABLE TEMPERATURE CONDITIONS

for increased flexibility and replication of real life conditions.

CONVENIENT INTERCHANGEABLE CRUCIBLES AND CELLS

to perform even the most demanding experiments using one instrument :

- high pressure (1000bar) and high vacuum
- pressure measurement and control
- mixing experiment

EXTERNAL COUPLING CAPABILITY

designed to increase your research options including manometry, BET instrumentation, gas analyzers, humidity controllers and gas panels

