

STSM Scientific Report

Purpose of the STSM

The main purpose of my short stage at the Ecole Nationale Supérieure d'Arts et Métiers - TREFLE Laboratory (Transfert Écoulements Fluides Énergétique) - Bordeaux (one week) was to improve my skills and knowledge concerning thermal analysis method for characterization of materials with potential use as phase change materials. This enables to propose new organic-inorganic hybrids and composite materials with potential application in energy storage after microencapsulation.

Description of the work carried out during the STSM

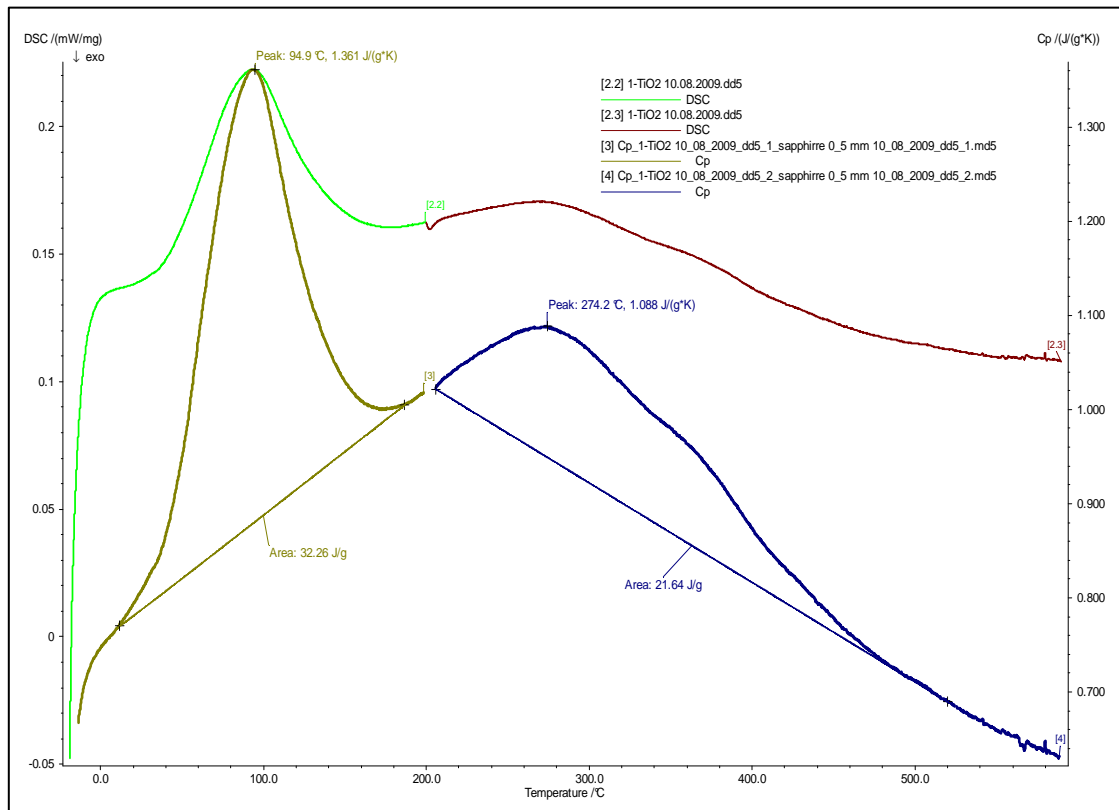
- First aim was to acquire new mutual knowledge and exchange of information regarding the activities of the two laboratories TREFLE-ENSAM and Nanostructured Material Laboratory –IMNR in the field of Phase Change Materials and existing infrastructure.
- Dr. Elena Palomo presented also a lecture about the actual problems in PCM.
- Thermal assessment of advanced nanostructured materials with potential use in energy storage.
- Five different nanostructured materials were synthesized in Nanostructured Materials Laboratory - IMNR in view of future use as material for encapsulation of different solutions of PCM. These samples are presented in the table below:

Sample	Type	Preparation method
Zinc hydroxide	Nanostructured powder	Chemical synthesis - hydrolysis
Zinc oxide	Nanostructured powder	Chemical method - hydrothermal
Titanium dioxide- TiO ₂ anatase	Nanostructured powder – 95% anatase	Chemical method - hydrothermal
Barium titanate BaTiO ₃	Nanostructured powder	Chemical method - hydrothermal

- Thermal assessment consists in comparison of the DSC results by two different methods using:
 1. Netzsch Maya F3 – system existing at IMNR
 2. Setaram system existing at TREFLE-ENSAM. The results of the DSC characterization will be performed and sent to my Laboratory during the month of July. Characterisation of one sample requires a couple of days to be accomplished.

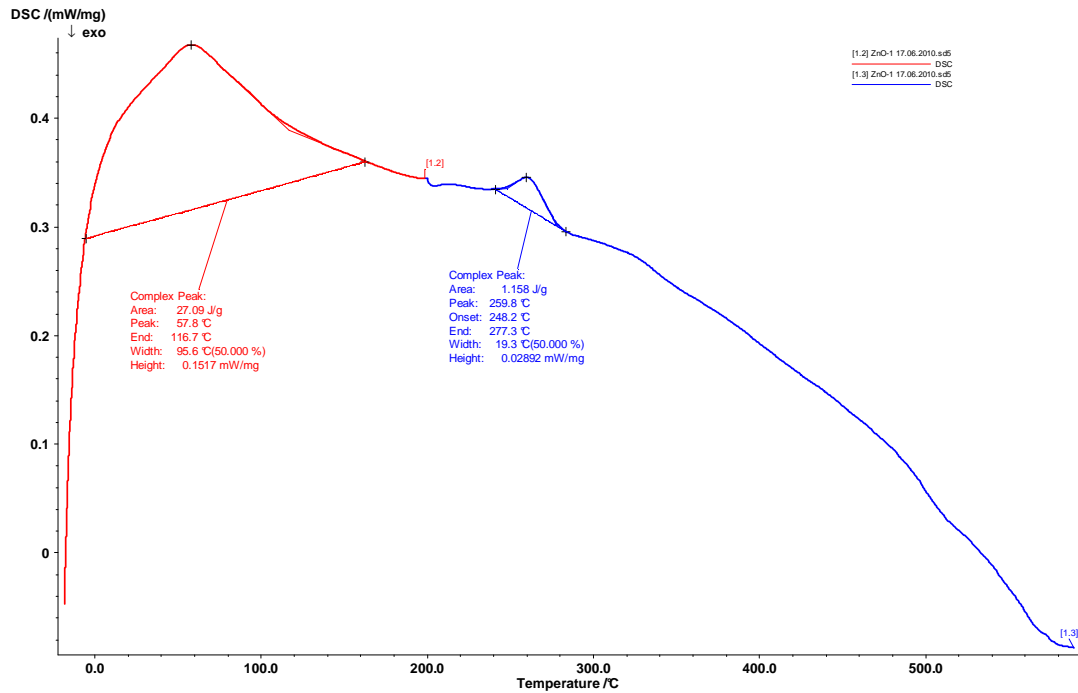
Description of the main results obtained

DSC characterization of the titanium dioxide



Peak 1 (°C)	Area 1 (J/g)	Peak 2 (°C)	Area 2 (J/g)
94.9	32.26	274.2	21.64

DSC characterization of zinc oxide obtained in hydrothermal conditions



Peak 1 (°C)	Area1 (J/g)	Peak 2 (°C)	Area 2 (J/g)
57,8	27.09	259.8	1.158

Further collaborations with host Institute

IMNR and TREFLE - ENSAM are interested in jointly cooperation in the frame of a future FP7-project related to Energy.

Foreseen publications/articles resulting or to result from the STSM (if applicable)

It is expected a joint publication after the completing the DSC measurement at ENSAM on similar samples and completion with other microstructure characterization.

Confirmation by the host institute of the successful execution of the STSM

The main objective of the STSM has been successfully reached. During a week, Mss. Rusti has been working at TREFLE for improving her knowledge concerning thermal analysis method for characterization of phase change materials (PCM). Besides, fruitful exchanges of information regarding the R&D activities of the NML-IMNR and the TREFLE in the field of PCM have taken place. As a result, further potential collaborations between both institutions have been identified.