

Title: **Fatty acid microcapsules synthesis to be used as thermal energy storage materials: improvement of the energy efficiency in buildings sector.**

Student: Guillermo López Galbán

Date: January 2020

Supervisor/s: Dra. Camila Barreneche Guerisoli
Departament de Ciència de Materials i Química Física

Phase change materials (PCMs) are substances which absorb or release amounts of energy in a form called latent heat when they go from a physical state to another.

This stored energy could be used for many applications: ceiling panels on buildings, refrigerant (cooling) systems or textile and footwear.

The main objective is to microencapsulate the PCMs in order to increase the energy efficiency of these substances and to increase waste heat recovery.

It is carried out an adapted version of a reaction described by Takahashi et al. (2007). In our case it is used a fatty acid: capric acid, with melting temperature contained in our work range: 31.6 C.

The parameters to be regulated will be the type of surfactant and the amount thereof, and the ratio between PCM and isocyanate.

The characterization of the capsules is performed by thermal, chemical and physical (pycnometry) analysis.

Techniques used are DSC to find melting/solidification temperatures and melting enthalpy. FTIR is used to evaluate the microcapsule shell material and to identify functional groups. Optical microscopy is to determine shape, size, fixation and durability of microcapsules. Thermal conductivity and apparent density (pycnometry) are measured.

The differences from other studies are focused on the eco-friendly perspective: the raw material is non-fuel derivative and it has a low cost of obtaining.

Keywords: Phase change materials, microencapsulation, thermal energy storage, waste heat recovery.