INNOVATIVE METHODS FOR ENHANCING HIGH TEMPERATURE THERMAL ENERGY STORAGE PROPERTIES OF PHASE CHANGE MATERIALS

Welcome to the first issue of the ENERHIGH newsletter!

With ENERHIGH project, it is our aim to develop **an economic and easy scalable encapsulation technology** of Phase Change Materials (PCMs) using cost effective materials and processes for thermal energy storage applications in the range of 300-500 ºC. The innovative materials will be tested and monitored from the chemical, mechanical and physical point of view. Moreover, a pilot scale process to validate the ENERHIGH products will be proposed.

In this first newsletter, the project will be presented, with main objectives, expected outputs and methodology used to achieve final results.
We encourage all of you to read this newsletter and visit our website for deeper knowledge of our work! (http://imnr.ro/enerhigh/)

PRESENTATION

ENERHIGH project is being carried out by the ***NATIONAL RESEARCH AND DEVELOPMENT INSTITUTE FOR NONFERROUS AND RARE METALS (IMNR)*** and co-financed by the Fund for European Regional Development in the frame of the **Competitiveness Operational Programme 2014-2020** in Romania, with a duration of 36 months, starting September 2016.

UNIUNEA EUROPEANĂ

GUVERNUL ROMÂNIEI

Instrumente Structurale 2014-2020

WHY ENERHIGH?

Solar energy is the most abundant renewable energy source. However, for maximum effectiveness of the energy power systems, an **energy storage method is required.**

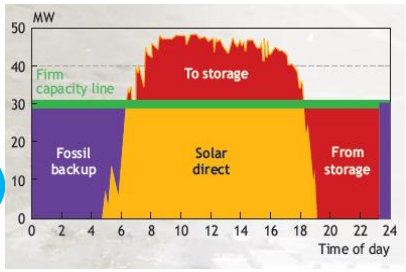
SOLAR ENERGY produces electricity by concentrating solar energy

Concentrated energy is used to heat up a fluid, produce steam and activate turbines that produce ELECTRICITY

Energy demand may not correspond with energy production

No greenhouse gas emission

Key technology for mitigating climate change



THERMAL ENERGY STORAGE solves the time mismatch between solar energy supply and electricity demand

Although thermal energy storage solves main limitation of solar energy, it is also currently facing different problems, such as **lack of thermal stability of the thermal energy storage materials** (currently molten salts) or serious **corrosion problems**. In this context, high temperature is considered when storage is performed between 120 and 600 ºC.

With ENERHIGH project, we will encapsulate PCMs in the 300-500 ºC temperature range to reduce corrosion problems as well as increase the durability and stability of the thermal energy storage materials

SPECIFIC OBJECTIVES

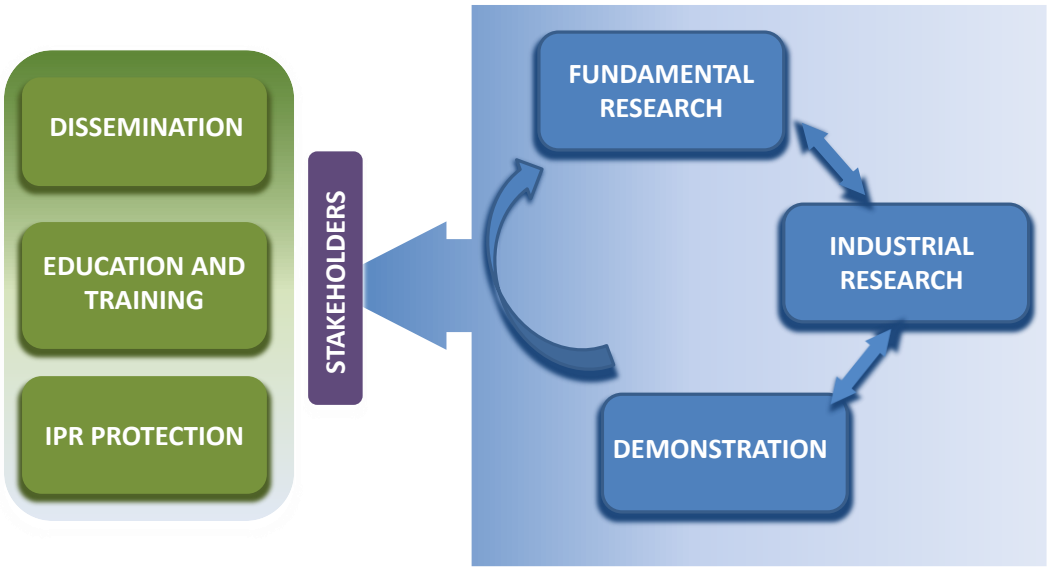
Increasing storage capacity > 10% for a lifetime of 15-20 years

Operation temperature range for thermal energy storage: 300-500 ºC

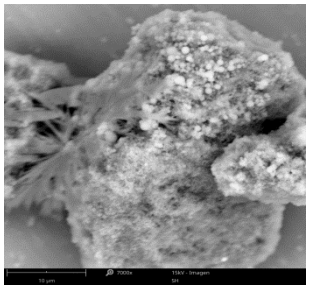
Reduction of 20 % of material degradation due to corrosion

With these objectives, **ENERHIGH has an important breakthrough to be achieved**.
Currently, there are no microencapsulated products in the market within 300 - 500 ºC melting temperature range and there is a lack of scientific research in this field.
Moreover, previously developed systems for encapsulation of materials with lower melting temperatures are not suitable, as those mostly uses polymers which degrade at temperatures such as 100 - 150 ºC, and are not useful for thermal energy storage within the range 300 - 500 ºC

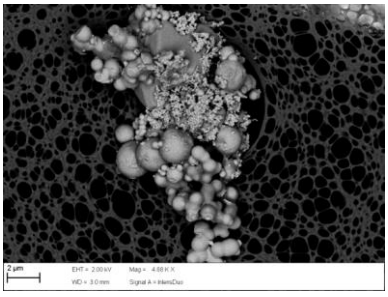
ENERHIGH CONCEPT and ACTIVITIES



- Development of microencapsulation techniques for PCMs with melting temperature range between 300 – 500 ºC in high temperature resistant shell



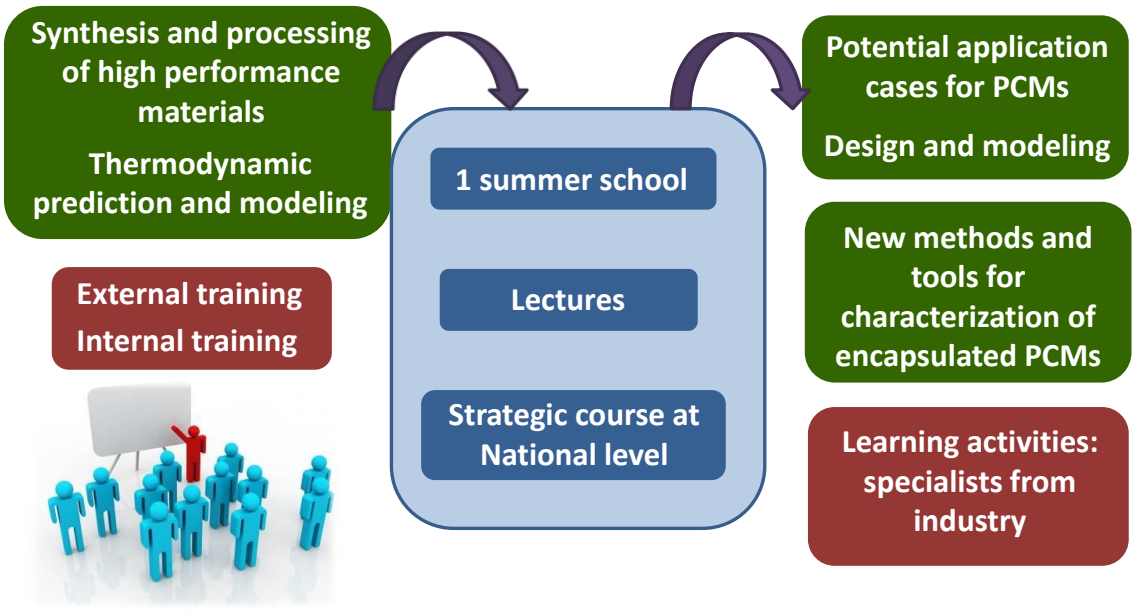
- Durability of microparticles synthetized
- Thermal conductivity and corrosion resistance of microencapsulated PCMs
- Pilot testing of the microencapsulation method developed



SEM and FESEM micrographs of synthetized $NaNO_3$-SiO_2 microparticles as thermal energy storage materials

- Design and execution of a pilot scale tank for testing functional characteristics of microencapsulated PCMs
- Dissemination and Communication activities
- Collaboration with institutions, platforms and networks, consortiums of current related projects for information exchange

EXPECTED OUTCOMES



WHAT MOVES US…

Innovation in energy technology is crucial to meet climate mitigation objectives while also supporting economic and energy security objectives

Cost-effective technologies are what will make the energy system transformation possible

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