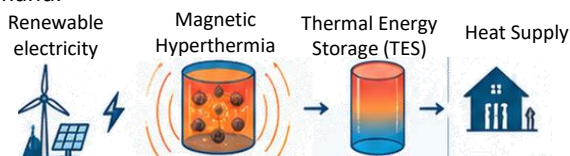


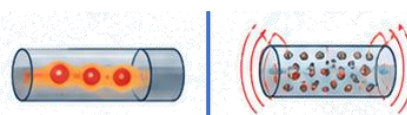
1. Project concept

HOTFUM integrates Power-to-Heat (P2H) with Thermal Energy Storage (TES) using magnetic nanoparticles (MNPs) in heat transfer fluids. The nanoparticles are heated by an alternating magnetic field (AMF), enabling uniform volumetric heating of the fluid, which is then stored and delivered as heat on demand.



Uniform heating | $\sim 50^\circ\text{C}$ in 8s | No resistive parts

2. Why magnetic nanoparticles?



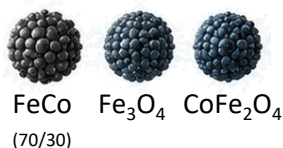
- ✗ Non-uniform heating
- ✗ Hot spots
- ✗ Lower efficiency
- ✗ Direct contact parts

- ✓ Volumetric and uniform heating
- ✓ Higher efficiency
- ✓ Fast response
- ✓ No resistive contact parts

MNPs improve heat transfer, reduce losses, and enable compact, scalable P2H-TES system

3. Materials

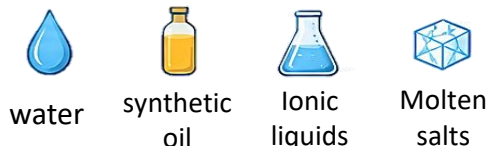
Magnetic Nanoparticles



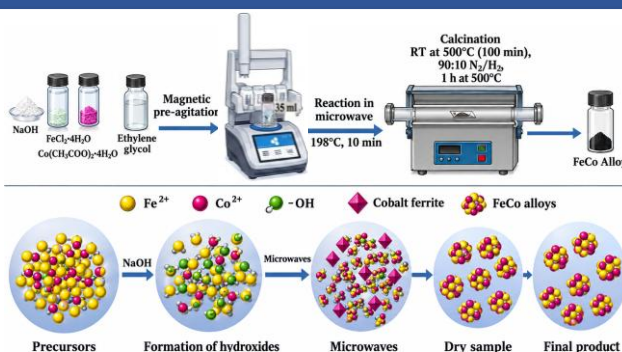
Key properties

- ✓ High magnetic response
- ✓ Good thermal conductivity
- ✓ Controlled size and morphology
- ✓ Surface functionalization for stability

Heat Transfer Fluids

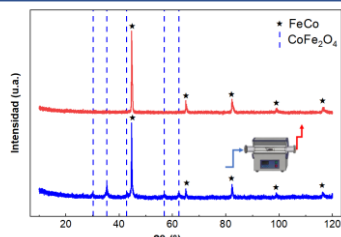
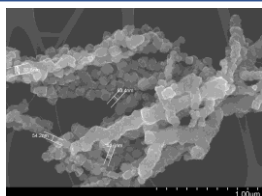


4. Nanoparticles synthesis



Fast process compared to traditional ones

5. Some key results



Correct FeCo phase ✓

NEXT

- Stabilization in different fluids
- Thermal and magnetic characterization

Nanometric size ✓

6. Communication and exploitation



Two patent applications



Congress participation

QIES 2026
ZAMORA
2 - 4 Septiembre 2026



Publication in progress

7. Research impact



Clean energy transition



Efficient thermal storage



Scalable and versatile technology



Contribution to climate goals

8. Partners



Acknowledgment

"Funded by the European Union (101205795-HOTFUM). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them."