AMADEUS Scope

AMADEUS project is exploring new materials and devices to enable the storage of energy at extremely high temperatures (>1000°C), well beyond the current technological limits. Based on these novel materials and devices, a new kind of ultra-compact LHTES (Latent Heat Thermal Energy Storages) device with unprecedented high energy density will be developed. In this way, AMADEUS addresses a new technology that is beyond the state of the art and is not currently foreseen by technology roadmaps. Being the first project of this kind, AMADEUS aims to kick-start an emerging research community around this new technological option.

AMADEUS Activities

The AMADEUS project is divided in four work packages (WPs):

• WP1 - Management, communication and exploitation of the project results.
• WP2 - Energy storage module (PCMs, containers, and thermal insulation)
• WP3 - Energy conversion module (thermionic & photovoltaic converters)
• WP4 - Final proof of concept experiment of a novel LHTES system

AMADEUS Objectives

• Develop novel phase change materials (PCMs) based on silicon and boron, with latent heat near or beyond 2 MJ/kg, and melting temperatures in the range of 1000–2000°C.
• Fabricate an optimal PCM casing and container enabling high thermal insulation and long term reliability at temperatures up to 2000°C.
• Demonstrate the proof of concept of a novel hybrid thermionic-photovoltaic device for the direct conversion of heat into electricity at ultra high temperatures.
• Demonstrate the proof of concept of a new LHTES system that integrates all the components developed during the project.

AMADEUS Impact

• Initiating a baseline of feasibility for a new energy storage technology and its future uses.
• Enabling a next generation of CSP (Concentrated Solar Power) systems.
• Enabling new devices for energy storage in buildings.
• Enabling new devices for energy storage and waste heat recovery in high temperature industries.
• Making cutting-edge research more open, collaborative, creative and closer to society.

Abbreviations

LHTES: Latent Heat Thermal Energy Storage
CSP: Concentrated Solar Power
PCM: Phase Change Material

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