

Metallic phase change material-composites for Thermal Energy management

Project Summary

Thermal Energy Storage (TES) systems can give strategic contribution to the efficiency and flexibility of intermittent power sources of various nature, but their temporal modulation up to long charge-discharge cycles passes through proper tuning of thermal properties of the materials exchanging heat with fluids in TES systems. M-TES project proposes an innovative approach to manufacture by a low-cost one-step process, granules of composite metallic Phase Change Materials, m-PCMs. They can be tailored in terms of enthalpy-temperature relationships and heat transfer properties to meet the material requirement for flexible TES systems. The 3-year M-TES project will be focused on immiscible alloy systems based on recycled Al-Si casting alloys and Sn, with no need for Critical Raw Material, adding a new option for re-use and recycling them. M-TES project will: (I) identify thermophysical requirements for m-PCMs service, (II) study alloy surface and wetting properties to support the (III) study of suitable process conditions, and (iv) obtain thermal/mechanical granule properties. A grained system will be tested as proof-of-concept, and (VI) its mechanical and heat transfer potential will be modeled to support further development, toward higher TRL and other alloys. The multidisciplinary project objectives will be accomplished thanks to the partners' knowledge and equipment complementarity: POLIMI, CNR, KIT, and OVGU. They will work in strict interaction within and between WPs. The young researchers hired for the project will be forged with curious multidisciplinary and deep understanding. M-TES dissemination plan will spread results preferring open activities, starting from scientific papers/conferences, widening to open science events for technicians/PhD students, up to the general public.

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