

Investigation of $Mg_{21}Cu_4$ eutectic alloy as new PCM for latent heat thermal energy storage

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ABSTRACT

A novel latent heat storage material (LHS) $Mg_{21}Cu_4$ eutectic alloy is investigated in this work. For this study, X-ray diffraction (XRD) and scanning electron microscopy (SEM) were performed to evaluate the synthesis method and the eutectic composition. The differential scanning calorimetry (DSC) was applied in order to determine the thermal properties such as melting point, latent heat, and specific heat. Thermal diffusivity and density of the solid alloy was measured by using laser flash apparatus and helium pycnometry, respectively. $Mg_{21}Cu_4$ exhibit interesting thermophysical properties to become a feasible PCM in thermal energy storage application.

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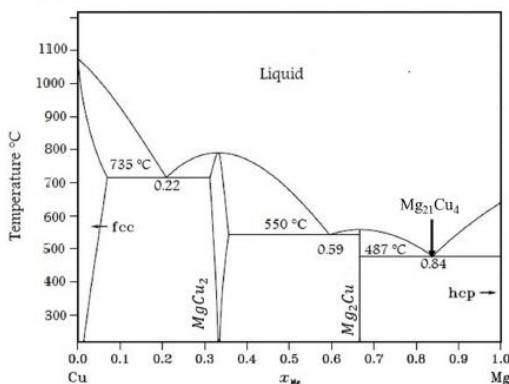


FIGURE 1. Equilibrium phase diagram of the Mg-Cu system.

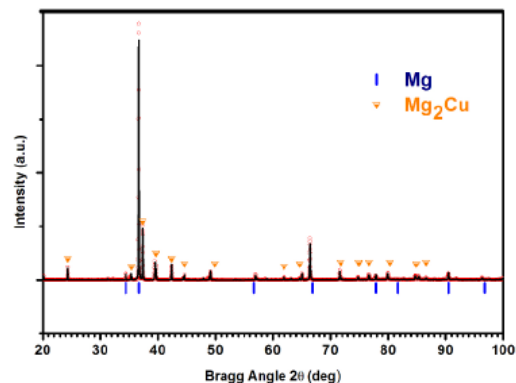


FIGURE 3. X-ray diffraction pattern of the cast $Mg_{21}Cu_4$ alloy.