# THERMALLY TRIGGERED SELF-HEALING MECHANISM IN Al-Sn COMPOSITE PHASE CHANGE MATERIALS

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Miscibility Gap Alloys (MGA) systems have been studied as an effective solution for producing novel composite fully metallic Phase Change Materials (PCM) in the recent years. Indeed, a proper choice of the metallic constituents, in addition to careful processing techniques, allows the achievement of the encapsulation of the active phase (low melting temperature phase) in the passive matrix (high melting temperature phase).

Among MGA systems, Al-Sn is receiving particular attention due to its accessible transition temperature and its compositional stability close to this latter. However, this system suffers leakage of the active phase above the eutectic temperature due to the low wettability between molten tin and aluminum, limiting their thermal storage performances.

In this paper, a preliminary investigation is conducted on the possibility of exploiting tin leakage as an effective self-healing mechanism, related to the specific microstructure of the alloy. Heat treatments with different temperatures and holding times were carried out on Al-Sn-based samples produced with different techniques (powder metallurgy, rapid solidification and additive manufacturing) in order to promote the exudation of the low-melting phase. Scanning electron microscope (SEM) was used to characterize the treated samples and a subsequent image processing was conducted for quantifying the leakage. The preliminary analyses show the potential for theoretically filling microcracks in the composite with the exudated low phase temperature, at least partly restoring the thermal conductivity of these material for thermal storage and management.