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Effect of Cooling Rate on Microstructural and Microhardness Properties of Al- (Mg2Si + Al3Ni) Matrix Composite

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ABSTRACT

Among the high-tech industries like automotive, aerospace, electronics, etc., aluminum matrix cast composites (AMCCs) are widely applied for the fabrication of accountable and especially acute pieces. During the present study, hybrid aluminum base composites containing Mg2Si and Al3Ni particles were fabricated successfully in casting moods and their structural characteristics were evaluated under different solidification conditions. A variety of microstructural measurements were performed on the composite microstructure in this study, including X-ray diffraction (XRD) and optical microscope (OM). Furthermore, a hardness test was conducted to evaluate the mechanical properties of the material. Results indicate that increasing the cooling rate during solidification reduces the average size of the Mg2Si initial phases, improves their distribution uniformity and increases their final amount whereas the average size of the Al3Ni particles decreases greatly but their content remains the same. In comparison to base alloys, hybrid composite with Mg2Si and Al3Ni particles shows the highest hardness.

Keywords: Al-based in-situ composites, hybrid intermetallic reinforcement, microstructural analysis, hardness, solidification rate, particle size.

RETRACTION NOTE: The article has been retracted by Journal due to ethical concerns. It is evident that the findings are unreliable due to misconduct or honest error; the findings have previously been published elsewhere without proper referencing, permission, or justification.