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Preparation of various aluminium matrix composites reinforcing by nano-particleswithdifferent dispersion methods

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Abstract: In this study, the effect of SiO_2 nano-particles dispersion methods to the aluminium matrix in two weight percent of 0.5 and 1 was investigated. First type of composites contained nano-particles which were pre-heated at 400 °C and then added to the melt. Second type of specimens were produced using nano-particles that prepared in the planetary ball-mill for 1 hour in combination with aluminium micro-particles. The hardness and the microstructure of nano-composites have been studied. The production method of nano-composites was the stir casting process. Besides, the distribution of nano-particles in the aluminium matrix for both types of specimens studied by the field emission scanning electron microscopy (FE-SEM) which was equipped by the energy dispersive X-Ray spectroscopy (ESD). Obtain result showed that the wetting parameter for the second type of specimens was higher than the first ones. FE-SEM images showed that the agglomeration size of nano-particle in the first type of specimens was lower than 100 nm. Such behaviour led to increase the hardness value of aluminium matrix composite to 141 BHN with the increase of 15% with respect the aluminium alloy.

Keywords: Nano-particles, Aluminium Matrix Composite, Planetary ball-mill, Pre-heating, Microstructure.