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Abstract

Aluminum metal matrix composites, which exhibit significantly high compressive strength, were produced through the squeeze casting process using aluminum 7075 alloy as the matrix material and 2.5 wt% alumina as reinforcement. The process parameters of squeeze casting were prudently selected based on the literature in order to obtain better mechanical properties such as compressive strength and hardness. Samples were examined using an optical microscope, energy dispersive spectroscopy, a scanning electron microscope, and X-ray diffraction analysis. The optical micrograph showed low porosity in the produced composite, which matched the porosity measured using the Archimedes principle. The scanning electron microscope showed uniform distribution of reinforcement in the grain boundaries of the matrix. An X-ray diffraction analysis confirmed the presence of Al_2O_3 particles in the composite. The hardness of the composite improved from 44 to 59 HRB. The compressive strength of the composite improved significantly with the addition of alumina reinforcement to 587 MPa when compared to Al 7075 alloy as well as other aluminum metal matrix composites reported in the literature.

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