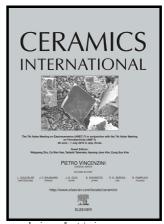
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Effect of B₄C, TiB₂ and ZrSiO₄ ceramic particles on mechanical properties of

aluminium matrix composites: experimental investigation and predictive modelling

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Abstract

This paper focuses on the influence of processing temperature and inclusion of micron-sized B₄C,

TiB₂ and ZrSiO₄ on the mechanical performance of aluminium matrix composites fabricated through

stir casting. The ceramic/aluminium composite could withstand greater external loads, due to

interfacial ceramic/aluminium bonding effect on the movement of grain and twin boundaries. Based

on experimental results, the tensile strength and hardness of ceramic reinforced composite are

significantly increased. The maximum improvement is achieved through adding ZrSiO₄ and TiB₂,

which has led to 52% and 125% increase in tensile strength and hardness, respectively. To predict the

effect of incorporating ceramic reinforcements on the mechanical properties of composites,

experimental data of mechanical tests are used to create 3 models named Levenberg-Marquardt

Algorithm (LMA) neural networks. The results show that the LMA- neural networks models have a

high level of accuracy in the prediction of mechanical properties for ceramic reinforced-aluminium

matrix composites.

Keywords: Composite Materials; Ceramic Reinforcement; ZrSiO₄; TiB₂; B₄C; Mathematical

Modelling.

1. Introduction

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