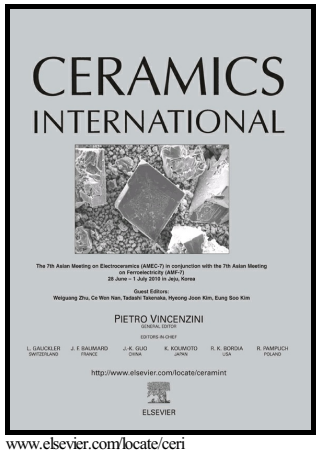

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PII: S0272-8842(16)00031-6
DOI: http://dx.doi.org/10.1016/j.ceramint.2015.12.181
Reference: CERI11979

To appear in: *Ceramics International*

Received date: 13 April 2015
Revised date: 31 December 2015
Accepted date: 31 December 2015

Cite this article as: K. Shirvanimoghaddam, H. Khayyam, H. Abdizadeh, M Karbalaei Akbari, A.H. Pakseresht, F. Abdi, A. Abbasi and M. Naebe, Effect of B_4C, TiB_2 and $ZrSiO_4$ ceramic particles on mechanical properties of aluminiur matrix composites: experimental investigation and predictive modelling *Ceramics International,* http://dx.doi.org/10.1016/j.ceramint.2015.12.181

Effect of B_4C, TiB_2 and $ZrSiO_4$ 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 B_4C, TiB_2 and $ZrSiO_4$ 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 $ZrSiO_4$ and TiB_2, 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; $ZrSiO_4$; TiB_2; B_4C; Mathematical Modelling.

1. Introduction

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