

Author's Accepted Manuscript

A novel graphene-stimulated semi-solid processing to fabricate advanced aluminum matrix nanocomposites

A. Fadavi Boostani, S. Yazdani, R. Azari Khosroshahi, Z.Y. Jiang, D. Wei



PII: S0921-5093(18)31188-2
DOI: <https://doi.org/10.1016/j.msea.2018.09.001>
Reference: MSA36882

To appear in: *Materials Science & Engineering A*

Received date: 29 April 2018
Revised date: 31 August 2018
Accepted date: 1 September 2018

Cite this article as: A. Fadavi Boostani, S. Yazdani, R. Azari Khosroshahi, Z.Y. Jiang and D. Wei, A novel graphene-stimulated semi-solid processing to fabricate advanced aluminum matrix nanocomposites, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.09.001>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A novel graphene-stimulated semi-solid processing to fabricate advanced aluminum matrix nanocomposites

A. Fadavi Boostani^a, S. Yazdani^{*a}, R. Azari Khosroshahi^a, Z.Y. Jiang^b, D. Wei^c

^a Faculty of Materials Engineering, Sahand University of Technology, Tabriz, Iran

^b School of Mechanical, Materials and Mechatronic Engineering, University of Wollongong, NSW 2522, Australia

^c School of Electrical, Mechanical and Mechatronic Systems, University of Technology, Sydney, NSW 2007 Australia

E-mail addresses: Yazdani@sut.ac.ir (S. Yazdani)
afb496@uowmail.edu.au (A. Fadavi Boostani)

*Corresponding author Tel.: +98 41 3345 9460

Abstract

This study reveals an unprecedented capacity of flake graphene sheets in manipulating semi-solid deformation of aluminium matrix nanocomposites by restricting the grain growth of the nanograins during the reheating process to significantly enhance (173%) the yield strength of the fabricated composites. The graphene sheets with onion shape have also shown the unique capability in alleviating the agglomeration of SiC nanoparticles, attributed to the manipulated Hamaker constant of these particles as a result of wrapping graphene sheets. A devised mathematical approach has authenticated, for the first time, the effect of wrapping graphene sheets on subtle adjusting the Hamaker constant of SiC nanoparticles to stimulate engulfment of these nanoparticles within solidifying matrix rather than agglomeration at grain boundaries. This, therefore, has resulted in diminishing the porosity and stimulating multi-scaled micro/nano grains, thereby significantly enhancing the tensile properties of the fabricated composites.

Graphical abstract:

Download English Version:

<https://daneshyari.com/en/article/10142031>

Download Persian Version:

<https://daneshyari.com/article/10142031>

[Daneshyari.com](https://daneshyari.com)