Title: Friction stir processing of squeeze cast A356 with surface compacted graphene nanoplatelets (GNPs) for the synthesis of metal matrix composites

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I. Abstract

Friction stir processing (FSP) was applied to graphene nanoplatelets (GNPs) physically compacted on the surface of squeeze cast A356 alloy to incorporate GNPs within the matrix and to improve its mechanical properties. Squeeze casting resulted in finer size silicon and intermetallic compounds in cast microstructure, and subsequently FSP further refined the microstructure of squeeze cast A356 alloy, and GNP reinforced A356 alloy. The finer Si particles, intermetallics and graphene dispersed in the matrix increased the tensile and yield strength of FSP squeeze cast A356 alloy compared to the results reported in prior literature for FSP A356 alloy. Eutectic Si needles have been converted to fine spherical particles during FSP and were uniformly distributed within the nugget zone. The crystallite size of GNPs which were physically adhered to the surface of squeeze cast alloy prior to FSP decreased after FSP as a result of deformation. Thus, a combination of squeeze casting, and friction stir processing and incorporation of GNPs reinforcement in the A356 matrix is a promising route to further improve its mechanical properties.

II. Image:

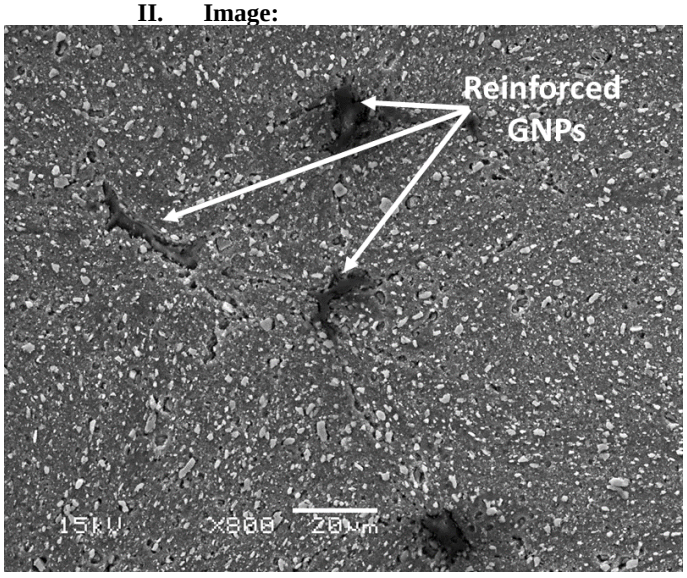


Figure: SEM micrograph of the composite showing GNPs embedded in the Friction Stir Processed metal matrix

III. Reference:

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IV. Biography:

Dr. Ajay Kumar has completed his PhD at the age of 30 years from Indian Institute of Science (IISc), Bangalore India and Postdoctoral Studies from School of Mechanical and Materials Engineering, Washington State University, Pullman U.S.A. and University of Wisconsin-Milwaukee, U.S.A. He is the Assistant Professor of Pandit Deendayal Petroleum University, a premier academic-research organization. He has published more than 20 papers in reputed journals and has been serving as an editorial board member of American Journal of Mechanical and Materials Engineering.

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