

Dear All,

INDIAN INSTITUTE OF SCIENCE  
INSTITUTE COLLOQUIUM  
(Mechanical Sciences)

Prof. M.K. Surappa  
Department of Materials Engineering

will deliver a lecture on

METAL MATRIX MICRO AND NANO COMPOSITES

on Friday, February 29, 2008  
at 4.00 pm in the Faculty Hall

THE DIRECTOR  
will preside

All are cordially invited

Coffee/Tea: 5.00 pm  
Venue: Reception Hall

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Abstract

Metal Matrix Composites (MMCs) are materials in which metallic base material (Al / Mg / Cu) is reinforced with a ceramic phase (in the form of continuous / discontinuous / nano size) in order to achieve or combination of attributes not attainable by either of constituents alone.

Research on synthesis of Metal Matrix Composites was nucleated at the Indian Institute of Science nearly three decades ago, with a limited objective of substituting expensive copper based materials through the development of aluminum based composites. Over the years variety of Aluminum / Magnesium based metal matrix composites containing C, SiC, Al<sub>2</sub>O<sub>3</sub>, B<sub>4</sub>C and flyash as reinforcements have been synthesized using stir-casting route (known as Indian Innovation). Presently, Metal Matrix Composites (MMCs) have emerged as an important class of materials with the potential to replace a number of conventional materials being used in automotive, aerospace, defence and leisure industries where the demand for light weight and higher strength components is increasing.

Solidification synthesis of variety of MMCs has led to the creation of new knowledge on the role of large volume fraction of (1-40%) of ceramic particles of varied sizes (100 nm to 100 µm) on the behaviour of Al/Mg alloys both in liquid and solid state. In this presentation intrinsic and extrinsic effect of ceramic particles including the solidification behaviour, sliding wear, abrasive wear, recrystallization and damping characteristics of aluminum and magnesium alloys will be elucidated. Major part of this presentation will focus on stir cast process where the matrix, in the form of liquid, is mixed with reinforcements and allowed to solidify to form a composite. Recent work on the fabrication of nano composites in bulk quantities by in-situ pyrolysis of polymeric pre-cursors in the liquid

melt and their superior properties compared to monolithic Mg alloys will be presented.

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