

# Non-Equilibrium Processing of Advanced Materials

## Overview

In the past few decades, there has been extensive research in the development of advanced materials with improved properties for both structural and functional applications. During these studies it has been demonstrated that the performance of these materials mainly depends on their composition and microstructure. The microstructure is, in turn, controlled to a large extent by processing and non-equilibrium processing routes have become very popular in developing materials with exceptional properties.

The present course first lays the foundation for structure-property-processing correlations. Then it brings out the whole gambit of non-equilibrium materials processing routes, with special emphasis on those involving liquid-solid transition (rapid solidification processing) and those involving solid state, such as those involving severe plastic deformation and mechanical alloying. The course covers the basic principles of the processes, basic thermodynamic and kinetic aspects related to the microstructure development during non-equilibrium processing. The course will also deal with advanced materials such as metallic glasses, nanocrystalline materials, and some functional materials developed through these non-equilibrium processing routes.

The course will stimulate research motivation of participants with the knowledge of the state of the art in the field from the most accomplished in this field.

<b>Dates for the Course</b>	<b>12<sup>th</sup> December, 2016 to 18<sup>th</sup> December, 2016</b>
<b>Last Date for Payment of the Course Fee</b>	<b>November 25, 2016 (The registration for the course will be considered as cancelled if the course fee is not paid before this date)</b>
<b>Host Institute</b>	<b>IIT Madras</b>
<b>No. of Credits</b>	<b>1</b>
<b>Maximum No. of Participants</b>	<b>50</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>▪ You are an UG/PG student studying metallurgy, materials science, mechanical engineering and interested to know about the advances in the field of improving and tuning the properties of alloys through non-equilibrium processing.</li> <li>▪ You are working in an industry that is interested in significant improvement in the properties of your alloys.</li> <li>▪ You are a scientist in an R&amp;D laboratory that deals with research on advanced materials.</li> <li>▪ You are a research scholar or faculty in an academic institution interested in learning about the advances in materials processing.</li> </ul>
<b>Course Registration Fees</b>	<p>The participation fees for taking the course is as follows:  <b>Student Participants:</b> Rs.1000  <b>Faculty Participants:</b> Rs.2000  <b>Government Research Organization Participants:</b> Rs.4000  <b>Industry Participants:</b> Rs.5000</p> <p>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p> <p><b>Mode of payment: Demand draft in favour of "Registrar, IIT Madras" payable at Chennai</b>  The demand draft is to be sent to the Course Coordinator at the address given below.</p>
<b>Accommodation</b>	The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: <a href="http://hosteldine.iitm.ac.in/iitmhostel">http://hosteldine.iitm.ac.in/iitmhostel</a>

## Course Faculty



**Prof. C. Suryanarayana** is in the Department of Mechanical and Aerospace Engineering, University of Central Florida, Orlando, USA. He is one of the most recognized global researchers in Metallurgy and Materials Engineering. His research interests are mostly on the development of metallic glasses, nanocrystalline materials and nanocomposites through non-equilibrium processing methods.



**Prof. B.S. Murty** is in the Department of Metallurgical and Materials Engineering, IIT Madras. He is one of the most popular teacher and researcher in India in the field of Metallurgy and Materials Engineering. His research interests are mostly in the development bulk metallic glasses, nano materials, high entropy alloys and in-situ composites through non-equilibrium processing routes.

## Course Coordinator

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URL: <http://mme.iitm.ac.in/murty>