

# TEQIP Workshop on: Thermal Analysis of Materials using DSC, TGA & Dilatometer (TAM-IV 2018)

From June 25th to 30th, 2018

## Over View:

Since 2015, three workshops have been conducted in this theme. Due to overwhelming responses and previous success, fourth workshop (TAM-IV 2018) has been planned. This workshop has been designed exclusively for early career Researchers and Young Faculty members to give orientations about various thermal characterization techniques. This training program will cover lectures on basics & fundamentals, followed by hands-on-experience. Lab has equipped with state-of-art facilities: DSC (404 F3, Netzsch) DSC+TGA (STA PT 1750, Linseis), and Vertical Dilatometer (Dilatronic-II HR 1650, Theta, USA). Experiments will be conducted. For variety of materials and methods to analyze the observed data will be demonstrated. Certificate will be given to participant after successful completion of the workshop.

## Modules:

Thermal analysis is important, where material's response is observed during temperature change and helpful in understanding of fundamental principles, mechanisms and process kinetics. It is used for most of materials, metals & alloys, ceramics, glasses, polymers, rubbers, chemicals and composites.

The course will be divided in to three modules.

### In module A is Differential Scanning Calorimetry:

Differential Scanning Calorimetry or DSC is the method to measure the heat involved during a process, which are exothermic or endothermic in nature. These are useful to calculate the specific heats, enthalpy and Gibb's free energy of the system. Processes which can be characterize, are: chemical reaction, phase transformation, recrystallization, melting, freezing, glass transition, etc.

### In module B is Thermogravimetric Analysis:

Thermogravimetric analysis or TGA is a method in which the change in mass of a sample is measured as a function of temperature and/or time. This provides information about thermal stability, absorption, desorption, oxidation, reduction, and thermal decomposition, etc.

### In module C is Dilatometer:

Dilatometer measures the volume or dimensional changes of the solid samples, when subjected to heating or cooling. Dilatometry is used to measure the thermal expansion coefficient of the solid and helpful in characterizing various other processes, such as phase transformation, glass-transition, solid-state sintering and liquid phase sintering etc.

## You Should Attend If....

## Fees:

For TEQIP Participants its free of cost.



**PROFESSOR CH. SUBRAHMANYAM** is currently a Professor in the department of Chemistry and The Dean of Academic Program of IIT Hyderabad. He has obtained his PhD from IIT Madras in the Department of Chemistry. He has worked as a Postdoc at the Department of Chemical Engineering, EPFL, Switzerland and several other places. Prior to joining to IIT Hyderabad, he has worked as faculty at NIT Trichy. His major areas of research are Materials Chemistry Heterogeneous Catalysis, Nanomaterials, Energy, and Environment, etc. He has published a large number of research articles, and engaged in several sponsored and consultancy projects.



**Dr. SASWATA BHATTACHARYA** is currently an Assistant Professor in the department of Materials Science and Metallurgical Engineering, at IIT Hyderabad. He has obtained his PhD from IISc Bangalore in the Materials Engineering department. He has worked as a Postdoc at Penn State University, USA, in the Department of Materials Science and Engineering. Prior to joining to IIT Hyderabad, he has worked at General Electric (GE) India Technology Center, Bangalore. His research areas are Computational Materials Science, Phase Field Modeling, Crystal Plasticity, Atomistic modeling, etc. He has published several research articles, and engaged in several sponsored and consultancy projects.



**Dr. BHARAT PANIGRAHI** is currently an Associate Professor and Head, Department of Materials Science and Metallurgical Engineering, at IIT Hyderabad. He is a PhD from IIT Kharagpur in the Department of Metallurgical and Materials Engineering. Prior to joining to IIT Hyderabad, he has worked abroad at: University of Aveiro (Portugal), and Korea Research Institute of Standards and Science, South Korea, etc. He is a recipient of several awards and fellowships, such as 'Promising Young Powder Metallurgy Professional Award' (India), Compromisso com a Ciência Fellowship (Portugal), Prof. G. S. Tendulkar Best Paper Award, etc. His major research areas are Powder Metallurgy, Sintering, Mechanical Alloying, Advanced Ceramics and Composites, Light Metal Alloys, High Entropy Alloys, etc. He has published several research articles.

**Course Co-ordinator**

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