

## ABOUT ROORKEE-LOGISTICS

Roorkee is a town of moderate size situated at the foothill of the Himalayas in the district of Haridwar (Uttarakhand). It is located on the banks of the upper Ganga Canal, which takes off at Haridwar, 30km away. Roorkee is well connected to Delhi by rail and road.

Weather in November is quite pleasant with temperatures ranging from 19° to 25°C.

## REGISTRATION

Participant Category	Registration Fee (Rs.)
Industry	6000
Academic and Research organisation	4000
Student	1500

- For registration, please contact the conference secretariat by Oct. 5th, 2011.
- Spot registration is also available.
- Registration is mandatory for all presenting authors.

Registration fee covers the expense of organizing the conference, cost of conference kits consisting of information, CD, proceedings of the Microstructure-2011 and lunch/tea/snacks.

## IMPORTANT DATES

Submission of abstracts	: 15.08.2011
Abstract confirmation	: 25.08.2011
Submission of full paper	: 30.09.2011

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## National Seminar

## MICROSTRUCTURE – 2011

on

## Microstructure Across Length Scales and Material Properties

4-5 November, 2011



Organized by



Metallurgical & Materials Engg. Dept.,  
IIT Roorkee

Sponsored by



Board of Research for Nuclear Sciences  
(BRNS) Mumbai

## BACKGROUND

The properties of bulk materials are a product of their inner structure as existing at different length scales. This inner structure, commonly called the microstructure, could be revealed under microscope employing high magnification as well as resolution. However, there is a dichotomy between the two, implying that increase in one does not necessarily accompany an increase in the other and it arises from the ability of the human eye to see two objects distinctly only when about 0.1 mm apart and held 10 inches from the face. In our effort to reveal inner structure of materials at increasingly smaller length scales, microscopes capable of having increasing magnification and resolution have been developed. Optical microscopes have taken our ability to see details of the size of microns revealing grains, phase constituents and solidification microstructures in bulk materials. Scanning electron microscopes reveal the inner structure even up to 1-2 nm at 1 kV. Transmission electron microscopes limited by spherical aberration may reveal details finer than 0.2 nm at 200 kV. The major advantage of an electron microscope also has been its major disadvantage. As the resolution increases, the field of view decreases, limiting information through high voltage microscopy. However, the phase of the electron wave carries the information about the sample and generates contrast in the image (phase-contrast imaging) in High Resolution TEM or HRTEM. High-angle annular dark field scanning transmission electron microscopy (HAADF-STEM) with finely focused electron probe (~0.2 nm) may result in even atomic-resolution imaging, by which the relatively heavy atom positions emerge out with highlighted contrast in the image due to Z (atomic number)-contrast nature. The development of microscope to probe the microstructure of materials across micron to nano-metric length scales has enabled us to understand the structure-property correlation contributing immensely to our capability to engineer materials for various applications.

## AIM

Since 2005, materials engineers from academia and industries gather for focused interaction on novel applications of the tools of microscopy and their exploitation for the development of materials. These seminars have been organized under the sponsorship of the Board of Research for Nuclear Science (BRNS). Last seminar in 2010 was organized by IIT Bombay and BARC on "Microstructural Engineering". In 2011, IIT Roorkee has taken the responsibility of organizing this seminar in collaboration with BARC and IIT Bombay on November 4-5, 2011. It is expected that, like every year, the invited talks, **contributory papers** and **poster presentations** will encourage in-depth intimate interactions within the community of materials engineers including students, who employs microscopy as a major tool for their work on materials development. A **metallography competition** will also be organized, for which entries containing micrographs obtained using optical microscope, SEM, TEM, AFM and any other advanced techniques will be accepted.

## SCOPE

Different aspects of metallography and microstructures will be covered in this conference, under the following categories:

- Microstructure characterization and emerging techniques
- Microstructure across different length scales and material properties
- Microstructure evolution and processes
- Critical aspects of microstructure and failure of materials during processing or in service
- Microstructure as a tool for failure analysis.

## REGISTRATION FORM

National Seminar  
**MICROSTRUCTURE – 2011**  
on  
**Microstructure Across Length Scales and Material Properties**

4-5 November, 2011

Name : .....

Designation : .....

Affiliation : .....

Accommodation: Yes/ No

If yes specify category : .....

Accompanying person: Yes/No

Registration fee : .....

Accommodation charges : .....

The registration form along with DD/Multicity Cheque in favour of Convener, Microstructure - 2011 may be sent to the address below.

### Contact

Convener/Secretary  
**Microstructure-2011**  
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