About IIT Kharagpur

IIT Kharagpur, the first, the largest and the most diversified among the IITs, has always been the leader since its inception year 1951. The motto of IIT Kharagpur is "Yogah Karmasu Kaushalam". This literally translates to "Excellence in action is Yoga", essentially implying that doing your work well is (true) yoga. IIT Kharagpur has 19 academic departments, eight multi-disciplinary centres/schools, and 13 schools of excellence in addition to more than 25 central research and development units.

The Institute takes pride in its relentless effort to provide the best platform for both education as well as research in the areas of science and technology, infrastructure designs, entrepreneurship, law, management, and medical science and technology. IITKGP is not just the place to study technology, it is the place where students are taught to dream about the future of technology and beam across disciplines, making differences enough to change the world.

Course Structure

30

working hours (6 hours a day)

Course Schedule and Venue

14 – 18 December 2020

Seminar Room, Materials Science Centre, IIT Kharagpur

Registration fee

Nil for TEQIP-III sponsored participants

For others –

- **Industry personnel: 5000/-**
- **Outside student: 2000/-**
- **IIT Kharagpur student: 1000/-**

Eligibility

B.E. / B.Tech in Ceramic Engineering, Materials and Metallurgical Engineering, Mechanical Engineering, Nanoscience and Nanotechnology
M.Sc- Physics, Chemistry, Materials Science

Last date for Registration

10 December 2020

Accommodation

Accommodation will be provided to the TEQIP-III sponsored participants at the campus Guesthouse. For other participants, the same will be provided on chargeable basis as per rule.

How to apply?

Use the link: https://erp.iitkgp.ac.in/CEP/courses.htm to apply ONLINE.

Signup → Login → Create profile → Choose course → Apply Now

Payment (if applicable) is to be made ONLINE after getting short listed for the program.

Contact

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NPIU

TEQIP-KIT

TECHNICAL EDUCATION QUALITY IMPROVEMENT PROGRAMME – KNOWLEDGE INCUBATION FOR TEQIP

NPIU - A Unit of MHRD, Govt of India for Implementation of World Bank Assisted Projects in Technical Education

Indian Institute of Technology, Kharagpur

Introduction to Glass Science & Technology

14 – 18 December 2020

Introduction / Overview

Glass is a non-crystalline, often transparent amorphous solid, that has widespread practical, technological, and decorative use in e.g. window panes, tableware, and optics. Glass is most often formed by rapid cooling (quenching) of the molten form, some glasses such as volcanic glass are naturally occurring. Soda-lime glass, containing around 70% silica, account for around 90% of manufactured glass. The term *glass*, in popular usage, is often used to refer only to this type of material, although silica-free glasses often have desirable properties for applications in modern communications.
The refractive, reflective and transmission proper ties of glass make glass suitable for optical lenses, prisms, optical fibers, and optoelectronics materials. When extruded as glass fiber and matted as glass wool so as to trap air, it becomes a thermal insulating material.

Course Objectives

The objective of the course is to provide a broad overview about glassy materials to the participants. It is an amalgamation of various scientific and technological aspects associated with the commercial production of glassy materials. The course will first discuss about glass and their importance in modern and ancient times, how they are formed or what governs their transition to a glassy state, what are their structures in the atomic and microstructural level and how to engineer with this microstructure. It will then turn towards the commercial production of glasses with a detailed discussion about the integrated technological aspects. Finally, it will deal with the mechanical properties of glassy materials and various ways to alter them so as to meet required property specifications. At the end, the course will shift focus to certain special types of glassy materials like bulk metallic glass, glass-ceramics, borosilicate glass, non-oxide glass, chalcogenide glass, optical fibres etc. The course content will be spread over 30 working hours (6 hours per day).

Course Content

- Introduction to glass
- Glass transformation behaviour (Enthalpy vs. temperature diagram, glass transition)
- Principles of glass formation
- Structures of glasses
- Phase transformations and microstructure development in glass
- Crystallization of glasses
- Phase separation in glasses
- Glass manufacturing: Principles and processes
- Viscosity of glass forming melts
- Viscoelasticity
- Mechanical properties of glass
- Strengthening of glasses (heat strengthening, thermal tempering, ion exchange, chemical strengthening etc.)
- Statistical nature of fracture of glasses
- Thermal shock and annealing of thermal stresses
- Special glass and glass materials
- Laboratory visits
- Practical experience of glass melting
- Characterization of glass

About the Faculty Coordinator

Dr. Shibayan Roy is currently an Assistant Professor in the Materials Science Center of Indian Institute of Technology IIT-Kharagpur in India. He has joined the institute from November 2015 and continuing till date.
Dr. Roy was a post-doctoral research associate at Materials Science and Technology Division in Oak Ridge National Laboratory, Oak Ridge, Tennesse, USA from November, 2013 to October 2015. Forewords, he worked as a post-doctoral researcher at Institute für Werkstoffwissenschaft und Werkstofftechnik (IWW), Fakultät für Maschinenbau, Chemnitz University of Technology, Chemnitz, Germany from February 2012 to September, 2013. Dr. Roy has obtained his PhD degree from the Department of Materials Engineering, Indian Institute of Science (IISc), Bangalore on November, 2011.
Dr. Roy was graduated from Calcutta University with a Bachelor degree (B. Tech) in Ceramic Technology in July 2003. He subsequently completed his Master's at Department of Metallurgical and Materials Engineering (MME), Indian Institute of Technology (IIT Kanpur) between August 2003 to May 2005. He had worked afterwards in National Aerospace Laboratories (NAL), Bangalore as Scientist B from June 2005 to July 2006.