Concepts of NMR for Analysis of Chemical and Material Properties

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Overview

A prerequisite for the development of any material for its biomedical and/or technological applications is to perform its chemical and physical analysis so that the exact composition, purity, and function of the material are ensured. For the last couple of years, Nuclear Magnetic Resonance (NMR) has emerged as one of the most informative spectroscopic techniques for the identification/characterization of the small molecules, macromolecules, and materials. NMR spectroscopy is an interdisciplinary science wherein the physicists, chemists, biologists and biomedical scientists are making use of this technique extensively.

This course will expose the participants to the fundamentals of NMR Spectroscopy and will build confidence and capability in the application of NMR spectroscopy. Exposure to the practical problems and their solutions, by taking various examples, will be provided that will enhance the capability of the participants to use different NMR experiments for the structure elucidation of the material and also making use of this technique for other purposes.

Course participants will learn these topics through lectures and hands-on experiments. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules	**Concepts of NMR for Analysis of Chemical and Material Properties : December 12 – 21, 2016** **Number of participants for the course will be limited to fifty.** 1. **Dec., 12, 2016**: Overview / general lecture: Compact NMR for analysis of chemical and material properties 2. **Dec., 13, 2016**: Basic Principles of NMR (NMR physics, Fourier NMR: spectroscopy and imaging, Laplace NMR: relaxation and diffusion, measurement and data processing) 3. **Dec., 14, 2016**: Chemical analysis (liquid-state NMR spectroscopy: chemical shift, indirect coupling, two-dimensional spectroscopy) 4. **Dec., 15, 2016**: Solid-state NMR spectroscopy (anisotropic spin interactions, wideline NMR spectroscopy, magic angle spinning, cross-polarization, two-dimensional spectroscopy) 5. **Dec., 16, 2016**: Fourier and Laplace NMR (the phase of the transverse magnetization: spectroscopy, imaging, flow, diffusion) 6. **Dec., 19, 2016**: NMR imaging and flow (*k*-space sampling schemes, slice selection, contrast) 7. **Dec., 20, 2016**: Materials testing by time-domain NMR (emulsions, polymers, elastomer, biological tissue, porous media) 8. **Dec., 21, 2016**: Mobile NMR of art and cultural heritage
You Should Attend If…	▪ you are a research scientist in Chemistry, Biology, Physics, material science interested in characterizing newly synthesized / extracted products. ▪ you are chemist or physict or biologist or geologist interested to learn application of NMR in your profession. ▪ you are a student or faculty from academic institution interested in learning basics of NMR and how to use NMR for the research purpose.
Fees	**The participation fees for taking the course is as follows:** **Participants from abroad : US $200 ; Industry/ Research Organizations: Rs. 5000/-** **Academic Institutions: BSc Students: Rs. 500/- ; MSc Students: Rs. 1000/-; PhD Students: Rs. 1500/- ; Faculty members: Rs. 2000/-** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

Prof. Dr. Bernhard Blümich, Chair of Macromolecular Chemistry at RWTH Aachen University, is one of the highly awarded faculties in the field of NMR. The research activities of Prof. Blümich aim at understanding the macroscopic properties of advanced polymer and functional porous materials by NMR on a microscopic and molecular basis.

Prof. Dr. Palwinder Singh is the faculty of Organic Chemistry in the Department of Chemistry, Guru Nanak Dev University, Amritsar. His research interest is in the area of medicinal and bioorganic chemistry involving rational design, synthesis, characterization and evaluation of materials as enzyme models; development of anticancer, anti-inflammatory and anti-fungal agents, and studying their mode of action.

Course Co-ordinator

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