Sonoprocess Engineering

Overview:

Ultrasound could enhance reaction rates by several orders of magnitude. Due to acoustic cavitation, a process where existing bubble nuclei in liquids grow and collapse under the influence of acoustic pressure variation, extreme physical and chemical effects are generated. The collapse of small cavities (less than microns) creates tremendous heat and pressure, shock waves, and particle accelerations. There is a constant demand for developing novel technologies to synthesize multifunctional materials and, perhaps more importantly, control their properties. The chemistry, induced by ultrasound is commonly referred to as Sonochemistry. Associated process development is referred to as sonoprocessing. Over recent years, Sonochemistry has shown significant growth in a variety of fields that include the preparation of functional bio- and inorganic materials covering length scales from nano to micro. This course will be highlighting both the fundamental and applied aspects of Sonochemistry and photo catalysis with a specific focus on the removal of organic pollutants in aqueous environment and synthesizing nano- and micro functional materials. Cavitation could also be achieved hydrodynamically, which will also be covered in this course. In addition to a series of lectures, there will be two practical session to demonstrate the practical applications of cavitation and to provide hands on experience to the participants on the use of ultrasound and hydrodynamic technologies in materials synthesis.

Modules and course details	**A: Sonoprocess Engineering (22 Feb 2016 to 26 Feb 2016)** **Course details** **Cavitation fundamentals** Introduction to cavitation; Fundamentals of the sonochemistry and applications; Single bubbel dynamics; Bubble temperatuere measurments, sonoluminescence, etc. **Cavitation & Applications** Sonochemical synthesis and characterisation nanoparticles; Ultrasonic synthesis of drug delivery vehicles; Ultrasonic food and bio processing; Sonochemical wastewater remediation, etc. **Number of participants for the course will be limited to thirty.**
You Should Attend If…	▪ You are chemical engineer or research scientist interested in synthesis and processing of different membranes. ▪ You are technologist/engineer interested to learn applications of wastewater treatment, different downstream processes, materials synthesis ▪ You are a student or faculty from academic institution interested in learning ultrasonic and sonochemistry.
Fees	The participation fees for taking the course is as follows: **Participants from abroad: USD 500** **Participation from Indian Industry/consultancy firm: Rs. 4000** **Faculty (Internal and external) and Scientist: Rs. 2000** **Students (with award of grade) :Rs1000** **Students (Without award of grade) :Rs 500** The above fee includes all instructional material, computer use for tutorials and assignments, laboratory equipment usage, 24 h free internet facility. The participants will be provided accommodation on payment basis (subject to availability).

The Faculty

Professor Muthupandian Ashokkumar (Ashok) is a Physical Chemist who specializes in Sonochemistry, teaches undergraduate and postgraduate Chemistry and is a senior academic staff member of the School of Chemistry, University of Melbourne. He is also one of the Associate Deans (Engagement and International) in the Faculty of Science. Ashok is a renowned sonochemist who has developed a number of novel techniques to characterize acoustic cavitation bubbles and has made major contributions of applied sonochemistry to the Food and Dairy industry. His research team has developed a novel ultrasonic processing technology for improving the functional properties of dairy ingredients. Recent research also involves the ultrasonic synthesis of functional nano- and biomaterials including protein microspheres that can be used in diagnostic and therapeutic medicine. He is an Editor of Ultrasonics Sonochemistry, an international journal devoted to sonochemistry research. He has edited/co-edited several books and special issues for journals; published ~310 refereed papers in high impact international journals and books; and delivered over 150 invited/keynote/plenary lectures at international conferences and academic institutions. Ashok has successfully organized 10 national/international scientific conferences/workshops and managed a number of national and international competitive research grants. He has served on a number of University of Melbourne management committees and scientific advisory boards of external scientific organizations. Ashok is the recipient of several prizes, awards and fellowships, including the Grimwade Prize in Industrial Chemistry. He is a Fellow of the RACI since 2007.

Professor A B Pandit

Prof A. B. Pandit is Professor of Chemical Engineering at the Institute of Chemical Technology, Mumbai, India. He was educated at Banaras Hindu University (BTech) and University Department of Chemical Technology, University of Mumbai (PhD). His research interests include Multiphase Rector Design, Cavitation Phenomena, Pollution control, Bubble Dynamics, Acoustic Signal processing, Mixing and Hydrodymanics and Cavitational Transformations. Dr. Pandit is a sought after consultant in the chemical industry and is Chairman of Hyca Technologies, a hydrodynamic cavitation technology company. Dr. Pandit has authored over 200 publications, 3 books, 10 book chapters, 5 patents and is on Editorial board of several International Scientific Journals.

Dr Shirish H. Sonawane

Dr Shirish Sonawane is currently working as Associate Professor in Chemical Engineering Department National Institute of Technology Warangal, Telangana State, India. His research Interest focuses on synthesis of hybrid nanomaterials, cavitation based inorganic particle synthesis, Sonochemical synthesis of nanolatex. Process Intensification, Hybrid Waste water treatment system, Fuel Cells, Membrane separation processes. Dr Sonawane is the recipient of fast track young scientist Project in year 2007 from Department of Science and Technology, Govt. of India. Dr Sonawane has published more than 80 research papers in reputed Journals, 7 book chapters, 6 Indian patent Applications. He was a recipient of prestigious BOYSCAST Fellowship from the Department of Science and Technology Govt of India in Year 2009. He is visiting academic and worked in Particle Fluid Processing Center, University of Melbourne. He is also Heritage Fellow and worked in Chemical engineering department, Instituto Superio Technico Lisbon Portugal 2013. Completed 6 consultancies from chemical industries and 4 research projects from Govt. Currently ISRO and Ministry of Environment and Forest Project is going on. 8 M.Tech,3 Ph.D awarded

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