Green Processing and Synthesis

Overview

Growing concern for the environment, increasing stringent standards for the release of chemicals into the environment and economic competitiveness have led to more environmentally friendly approaches that have resulted in greater pollution prevention via waste reduction and efficiency maximization. So Green process engineering and synthesis is an important tool that could make significant contributions in the drive toward making hazardous and wasteful processes more sustainable for the benefit of the economy, environment and society. The guidelines that could be used by scientists and engineers for designing new materials, products, processes and systems. These developments share a common focus on "**Green Processing and Synthesis**" an approach that has been around for quite some time but has truly emerged only in the past few years as a special and interesting discipline of chemical engineering.

This short course is primarily targeted toward graduate students and researchers who do not have prior knowledge in green process synthesis but are interested in expanding their research topics to this field. The course will be organized into three modules including the introduction and application of Green Chemistry, Design and Novel Approach to green process synthesis, Microfluidic and Nanofluidic technologies in green processes. We will study in-depth the fundamental principles of green process synthesis with some latest research results and trends.

Modules	**Introduction (Review of pre-requisites)**	**11-10-2020 (Optional)**
	Module 1: Introduction and application of Green Chemistry	**12-10-2020 to 13-10-2020**
	Module 2: Design and Novel Approaches to green process synthesis	**14-10-2020 to 15-10-2020**
	Module 3: Microfluidic and Nanofluidic technologies in green processes	**16-10-2020**
You Should Attend If…	▪ You are a student (B.Tech./M.Sc./M.Tech./Ph.D.) and aspiring researcher within a broad domain of chemical engineering. ▪ You are an Executive/engineer or researcher from manufacturing, service and government organizations including R&D laboratories. ▪ You are Faculty and staff from reputed academic institutions and technical institutions.	
Fees	The participation fees per person for attending the course is as follows: **Participants from abroad: US $400** **Industry/ Research Organizations: Rs. 10,000/-** **Academic Institutions:** **Students: Rs. 2950/- (For SC/ST student course fee is Rs.1475/- only)** **Non-Students: Rs. 5900/-** The above fees include all instructional materials, computer use for tutorials, free internet facility, tea and snacks. The course fee is inclusive of 18% GST as per institute norm. The participants may avail single bedded shared accommodation and food (breakfast, lunch and dinner) **if requested** on an additional payment basis.	

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 currently the Assistant Deputy Vice-Chancellor International at the University of Melbourne.

Ashok is a renowned sonochemist, with more than 20 years of experience in this field, and has developed a number of novel techniques to characterize acoustic cavitation bubbles and has made major contributions of applied sonochemistry to the Materials, 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 that can be used in energy production, environmental remediation and diagnostic and therapeutic medicine. He is the Deputy Director of an Australian Research Council Funded Industry Transformation Research Hub (ITRH; http://foodvaluechain.unimelb.edu.au/#research; Industry Partner: Mondelez International) and leading the Encapsulation project (http://foodvaluechain.unimelb.edu.au/research/ultrasonic-encapsulation). He has received about $ 15 million research grants to support his research work that includes several industry projects. He is the Editor-in-Chief of *Ultrasonics Sonochemistry*, an international journal devoted to sonochemistry research with a Journal Impact Factor of 7.3). He has edited/co-edited several books and special issues for journals; published ~410 refereed papers (**H-Index: 58**) in high impact international journals and books; and delivered over 200 invited/keynote/plenary lectures at international conferences and academic institutions. Ashok has successfully organised 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.

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Course Co-ordinator

Aniruddha B. Pandit was born on 7th December 1957 in Mumbai, Maharashtra. He earned his B. Tech (Chem) degree from Indian Institute of Technology(IIT), Banaras Hindu University in 1980 and earned his Ph.D. (Tech) degree from University Department of Chemical Technology (now ICT), in1984. From 1984 till 1990 he worked in the Department of Chemical Engineering, University of Cambridge, United Kingdom as a Research Assistant & then as a Research Associate with Prof. J. F. Davidson.

After returning to India in 1990, he joined ICT as a UGC Research Scientist 'B' and was subsequently promoted to Scientist 'C' (Professor's Grade) in 1996. He was instrumental in starting a major activity & program in the area of Hydrodynamic Cavitation for intensification of physical and chemical processing applications. He has successfully exploited the cavitation phenomena for a variety of operations such as crystallization, emulsification, nano-particle synthesis and processes such as esterification, oxidation etc on industrial scale. He has been an active industrial consultant for many large size national and international companies. A unique creative approach of using fundamental knowledge, coupled with simple, elegant experiments has resulted into novel cavitational reactors. Prof. Pandit has authored over 370 publications, 5 books and over 12 chapters (with over 22000 citations) and has 15 patents & is on the Editorial board of five International Scientific Journals. He has guided 48 PhD's and 88 master's students so far.

In addition to his research contribution, Prof. Pandit has contributed to innovation in teaching, at graduate and undergraduate levels, demonstration experiments for elaborating the physical principles of many chemical engineering operations. He is actively involved in working with committees in the area of harnessing solar energy & with tribal population in extending the chemical engineering principles for drying of farm/ forest product & water disinfection for potable water. He is a president of a NGO named Land Research Institute dealing with the Energy and Town planning sector. He has been the co ordinator of ICT-DAE center for Chemical Engineering Education and Research since its inception in 2008. He is on the editorial board on 5 international journals and is an associated editor of Ultrasonic Sonochemistry. He has successfully guided and completed international science collaborations with Universities from France, Australia and the The Netherlands. He is also on the project appraisal and evaluation committees of the DST and UGC, Govt of India. He is currently serving as a member of the BOG of the IIT Bombay He has been an active industrial consultant to many national and international industries.

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Shirish Sonawane currently workings as Professor and Head. He worked in the Process Control Laboratory, University of Dortmund, Germany in 2002. He visited and worked in Particle Fluid Processing Center, University of Melbourne, Australia. He received the Heritage Fellowship (2013) and worked in Chemical engineering department of Instito Superio Technico, Lisbon, Portugal.

He also conducted hands on short term training workshops on Micro Reactors, Advanced Flow Reactor, Process Intensification etc., for M. Tech/Ph. D Scholars and young faculties. He is conducted an International conference on Chemical and Bioprocess Engineering and New Frontiers in Chemical, Energy, and Environmental Engineering at NIT Warangal. Dr. Shirish Sonawane also organized GIAN programme on Sonoprocess Engineering, Membrane Separation Processes and Process intensification at NIT Warangal. He has published More than 150 SCI journal. He having more than 4000 citations and 36 book chapters and 3 books. He has filed 19 patents out of them 4 patent he been granted. Presently 8 PhD, 1 M.Tech students are working and 13 Ph.Ds are awarded. Sonoprocess engineering, cavitation based Nanotechnology, Waste water treatment, process Development for nanoparticle synthesis, polymer nanocomposite etc. are some of the fields Dr. Shirish Sonawane has developed and indigenous technologies for the waste water treatment using hydrodynamic cavitation processes for specifically dye waste water. He developed the process to load the liquid organic anticorrosion agents which can give the self-healing mechanism for the anticorrosion coatings and have large demand in the coating industry specifically in marine industry and wind mill manufactures. Recently he got an IMPRINT SERB project, Govt. of Indi, earlier he got international projects such as Indo-Tunisia Bilateral Project sponsored by DST, Govt. of India (2017), Indo-Russia DST-RFBR (2018), BIRAC-SRISTI- GYTI project, Govt. of India (2017), Department of Information and Technology, Government of India (2014).. He having international collaborations with Australia, Portugal, Russia, Malaysia, Tunisia etc. He is recipient of BOYSCAST Fellowship from DST, (2008-2009); Heritage Fellowship from Erasmus Mundus Program (European commission) in 2013; DST Young Scientists award (2007); Institution of Engineers India award (2016); Fellow of Maharashtra Academy of Sciences award (2016); (2017), BIRAC-SRISTI- GYTI award (2017), V.N.M.M award from IIT-Roorkee (2017), Fellow of Telangana Academy of Sciences award (2017), Institution of Engineers India (2017).

Dr. Shriram Sonawane is an Associate Professor in the Department of Chemical Engineering, Visvesvaraya National Institute of Technology, Nagpur (India). Dr. Shriram Sonawane's (nominee) major contributions in the engineering field are centered on the development of high efficient nanofluids and nanocomposite materials for various industrial and day to day applications.

Dr. Sonawane's work has led to the development of new nanofluidic application technologies that are commercially relevant. His work specifically focused on nanofluid and microfluidic technology, process intensification, various sonochemical processes, Starting from the lab–scale research to develop novel processes, the nominee developed high efficient nanofluidic systems to decrease energy consumption. The nominee was granted 1 Indian patent which notably benefited various industrial organizations. He has filed additional 4 patent applications that are currently under examination. Developing the indigenous process technologies has been the nominee's focus, which has greatly impacted the chemical engineering industry in India. Dr. Sonawane implemented several short–term, time–targeted research programs that addressed the problems in taking the laboratory research to the industry and he tackled them with the help of his post–graduate students, thus creating a complete practical framework for the technologies developed during his time

The nominee's publication profile shows the depth of his research impact in his field. He has published over 50 articles in reputed SCI journals such as International Communications in Heat and Mass Transfer, Ultrasonics Sonochemistry, International Journal of Hydrogen Energy, Separation and Purification Technology, to name a few. Scopus citations of 919 and *H*–index of 20 show that Dr. Sonawane is one of the highly cited experts in his area of research. Nonetheless, he also published 10 book chapters and 1 book with renowned publishers such as Elsevier and Taylor & Francis. He has also delivered 15 invited talks on various platforms. The nominee has supervised 7 PhD and 2 M.Tech students who are well–placed in the chemical engineering industry. Currently, he supervises 2 PhD students, which are funded through various grants. Dr. Sonawane's research programs are well–funded by government agencies in India. He has successfully completed 2 projects funded by SERB, DST. Currently, he is working on the projects of more than 60 lakhs rupees funded by Department of Science and Technology. Dr. Sonawane has received several prestigious awards for his contributions to engineering research. He is an elected fellow of Maharashtra Academy of Sciences.