

## Registration Fees

|                                   |             |
|-----------------------------------|-------------|
| Participants from abroad:         | US \$400    |
| Industry/Research Organizations:  | Rs. 5,000/- |
| Academic Institutions:            |             |
| Faculty and Scientist             | Rs. 2000/-  |
| Students (Without award of grade) | Rs 1000/-   |
| Students with award of grade      | Rs 1500/-   |

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.

**Last Date of Registration:**

**20 May, 2022**



### Patron

**Prof. N V Ramana Rao**  
Director, NIT, Warangal-506004

### Foreign faculty

**Professor Sivakumar Manickam**  
Petroleum and Chemical Engineering,  
Universiti Teknologi, Brunei.

### Indian Faculty

**Dr. Aniruddha B. Pandit**  
Institute of Chemical Technology,  
Mumbai

**Dr. Shriram Sonawane**  
Visvesvaraya National Institute of  
Technology Nagpur.

### Course Coordinator

**Dr. Shirish Sonawane**  
Professor, Chemical Engg Department  
NIT, Warangal-506004  
([shirish@nitw.ac.in](mailto:shirish@nitw.ac.in))

### Co-coordinator

**Dr. Prakash Saudagar**  
Assistant Professor  
Biotechnology Department  
NIT, Warangal-506004



## Greener and Cleaner Ultrasonic Process for Nanomaterials and Nanopharmaceuticals

**27 June -1 July, 2022 (Offline)**



**DEPARTMENT OF CHEMICAL ENGINEERING**  
**NATIONAL INSTITUTE OF TECHNOLOGY**  
Warangal, Telangana State India 506004

# How to Apply:

## Stage-1: Web Portal Registration:

Visit <http://www.gian.iitkgp.ac.in/GREGN/index> and create login User ID and Password. Fill up the registration form and complete web registration by online payment of Rs. 500/-. This provides the user with life time registration to enroll in any number of GIAN courses offered.

## Stage-2: Course Registration:

Login to the GIAN portal with the user ID and Password already created in Step 1. Click on Course Registration option at the top of Registration form. Select the Course titled "Greener and cleaner ultrasonic process for nanomaterials and nanopharmaceuticals" from the list and click on save option. Confirm your registration by clicking on "Confirm Course". Course will be offline.

## Details for NEFT

|              |                           |
|--------------|---------------------------|
| Account Name | GIAN NITW                 |
| Account No.  | 62447453600               |
| Bank         | State Bank of India       |
| Branch       | REC Warangal (NIT Campus) |
| Branch Code  | 20149                     |
| IFSC         | SBIN0020149               |
| MICR Code    | 506002030                 |
| SWIFT Code   | SBININBB                  |

Note: For confirmation of registration, the proof of payment (a scanned copy Demand Draft/NEFT transaction details) along with the registration form and copy of PDF generated at GIAN portal (if registered through GIAN portal) are to be e-mailed to [shirish@nitw.ac.in](mailto:shirish@nitw.ac.in)

Candidates registering early will be given preference in short listing process

For any queries regarding registration of the course, please contact the course coordinator

## Who can participate?

- This program is open to the faculty, UG, PG students, and research scholars working or interested in the aligned area.
- Engineers/Scientists working in Industries, Interested in process intensification of chemical processes.



Selected candidates will be intimated through e-mail. They have to remit the necessary course fee (Mandatory for all) and boarding & lodging fee (if boarding & lodging is required) to the Bank as per the details given below.

1. Name (in block letters):.....
2. Gender: .....
3. Category: Student/Non-Student/Industry
4. Address: .....
5. Telephone/Mobile No. ....
6. E-mail ID: .....
7. Highest academic qualification: .....
8. NEFT transaction number/DD number .....
9. Date of transaction .....
10. Amount .....

## CONTACT

### Dr. Shirish H. Sonawane

Professor, Chem. Engg Dept., NIT, Warangal 506004

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### Dr. Prakash Saudagar

Assistant Professor, Biotechnology Dept. NIT Warangal

Email: [ps@nitw.ac.in](mailto:ps@nitw.ac.in)

## Foreign Faculty



### Professor Sivakumar Manickam

Professor Sivakumar Manickam is a Chemical Engineer specializing in the process engineering of nanomaterials, especially nanopharmaceuticals. Currently, he is working with UTB, Brunei and earlier, and he was working with the University of Nottingham, International Campus, Malaysia. His research focuses on the process development of cavitation-based reactors towards technologically important nanomaterials, greener extraction of natural products, water treatment, development of pharmaceutical nanoemulsion and utilizing novel carbon nanomaterials to design biosensors for the earlier detection of cancer and diabetes. He took various leadership roles at the University of Nottingham, including Director of Research, Founding Director for the Centre for Nanotechnology and Advanced Materials, Head - Manufacturing and Industrial Research Division and Associate Dean for Research and Knowledge Exchange. He has completed more than 20 industrial and government-funded projects and supervised more than 50 research students. He has published ~250 peer-reviewed journal and conference papers. His h-index is 50 (scholar google). He is also the Executive Editor of Ultrasonics Sonochemistry (Elsevier, Q1, IF 7.5) Journal. He serves as the board member of Asia Oceania Sonochemical Society (AOSS), as well as the Fellow of Higher Education Academy (UK) and Fellow of the Royal Society of Chemistry (FRSC).

## Indian Faculty



**Dr. Aniruddha B. Pandit** is currently Vice Chancellor of ICT, Mumbai. Prior to this he has acted as a Dean HR and Research Consultancy and research Mobilization. He has been the coordinator 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 Netherlands. He has published more than 400 research articles in international journals. He is currently serving as a member of the BOG of the IIT Bombay. Research Students: Ph.D.: Completed - 36, ongoing - 21 Masters: Completed - 64, Ongoing - 6 Research Publications:315; Citations: 20,903 h-index: 77 (as per Scopus) Patents: 16 Conferences: 160; Seminars: 190.



**Dr. Shiram S Sonawane** is an Associate Professor in Chemical Engineering at Visvesvaraya National Institute of Technology Nagpur. Dr. Sonawane's research area includes Polymer Nano-composites, Nanofluids, Nano-Separation Technology, Process Modeling and Simulation. He has published 3 Indian patents, more than 150 research papers, edited 3 books and published more than 30 book. Nominated for the prestigious "Shanti Swarup Bhavnagar Award" for 2020, and 2021. He has received the "Fellow Award" from the Prestigious Maharashtra Academy of Science". He is Guest Editor for Sustainable Energy Technologies and Assessment (ELSEVIER) (Impact factor: 5.3). He is the "Executive Guest Editor" of the Current Pharmaceutical Biotechnology (Impact Factor: 2.8)

### Dr. Shirish Sonawane



**Dr. Shirish Sonawane** is currently working as Professor at Chem. Eng. Dept. 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 by cavitation. 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 150 research papers in reputed journals, edited 3 books, 25 book chapters and 14 Indian patent Applications. 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), Alexander Von Humboldt Connect Program Germany (2020), NASI (2020), NAWA (2020), IChE Award for the Year 2020: Hindustan Dorr-Oliver Award.



**Dr. Prakash Saudagar** is Assistant Professor at Biotechnology Dept. NIT, Warangal. His research areas include Molecular Cell Biology & Protein Biochemistry Molecular Approach to Infectious Diseases. He has published 38 research papers in reputed journals, 10 conference publications, Conducted 3 workshops. He has been sanctioned with 4 has been sanctioned with 4 DST-SERB funded research projects.



## About GIAN Course

About GIAN Course: Ministry of Human Resource Development (MHRD), Government of India (GoI) has launched an innovative program titled "Global Initiative of Academic Networks (GIAN)" in higher Education, in order to garner the best international experience. As part of this, internationally renowned Academicians and Scientists are invited to augment the Country's academic resources, accelerate the pace of quality reforms and elevate India's scientific and technological capacity to global excellence.

## About NIT Warangal

National Institute of Technology Warangal, formerly known as Regional Engineering College was established in 1959. Over the years it has developed into a premier institute of higher learning and is ranked among the top technical education institutions in India. There are 14 Departments offering eight undergraduate and 31 post-graduate programmes besides doctoral programmes. About 5000 students across the country and about 500 international students' study in the campus. It is a fully residential campus sprawling over 250 acres with excellent infrastructure.

**About Warangal:** Warangal is the second largest city of the state of Telangana. It is situated at a distance of 140 km from the state capital Hyderabad (Nearest Airport). It is well connected by Rail (Kazipet Junction is 2 km away and Warangal Station is 12 km away) and by Road (NH 202). Warangal is renowned for its rich historical and cultural heritage. It was the seat of erstwhile 5<sup>th</sup> Kakatiya dynasty. It is a place of tourist attraction with a number of historical monuments like Thousand Pillars Temple, Warangal Fort, Bhadrakali Temple, Ramappa Temple and Laknavaram Lake



## About the Department

The Department of Chemical Engineering was established in the year 1964 and celebrated Golden Jubilee year in 2014. The Department offers B.Tech in Chemical Engineering, two M.Tech programmes (each in Chemical Engineering and Process Control) and Ph.D programs. Currently, the Department has 15 faculty members with different research expertise. The Department has good research facilities for both experimental as well as simulation based research.



## Overview of the Course

The ultrasound (US) can play key role in the production of active pharmaceutical ingredients (APIs). It also has the wide applications in pharmacy such as in controlling particle size, controlled crystallization, production of nano materials, enhancing the solubility of poorly soluble drug candidates. Furthermore, the use of ultrasound during the tableting of pharmaceutical powders is a new emerging area. Ultrasound improves the characteristics of the compression process leading to optimized mechanical strength of the compacts without applying excessive compression force.

Therefore, problems associated with high-pressure compression in tableting can be overcome and tablets may be manufactured more economically and consistently with the aid of ultrasound compared to conventional pressure processes. The countless achievements of API US-assisted production with outstanding effects such as narrower particle size distribution; decreased particle size, induction time, metastable zone and super-saturation levels; or a solubility increase. The process of drug (API) manufacturing can be broken down into a series of unit operations, such as sifting of ingredients, mixing and lubrication and encapsulation (filling) and polishing. Ultrasound plays a vital role in manufacturing nanomaterials and pharmaceuticals with both cost-effective manner and environment friendly.

This course will be highlighting both the fundamental and applied aspects of Sonochemistry and synthesis routes for nanomaterials and pharmaceuticals with a specific focus on greener and cleaner processes.

### The primary objectives of the course are as follows:

Take an attention of participants and industrial persons towards ultrasonic processes as it is

- green and clean route for synthesis of value added products.
- Exposing participants to the fundamentals of acoustic and hydrodynamic cavitation and sonoprocess engineering.
- Exposing participants to the fundamentals of acoustic and hydrodynamic cavitation and sonoprocess engineering.
- Overview of different paths for nanomaterial synthesis using ultrasound approach and its benefits over conventional synthesis routes
- Overview and guideline for different pharmaceuticals processes where ultrasound technology can be considered as green and clean route of synthesis

### Day 1:

**Introduction: Ultrasound process** overview: Fundamentals of ultrasonic wave generation, Instruments to generate ultrasonic waves. Ultrasound generating equipment: Horn and bath reactor

### Applications of ultrasound

pharmaceuticals, food industries, waste water treatment

### Day 2:

#### Explain the pharmaceutical process basics

Pharmaceuticals and active pharmaceutical ingredients (API) synthesis processes with ultrasound cavitation

**Ultrasound technology in pharmaceuticals:** sifting of ingredients, mixing and lubrication and encapsulation (filling) and polishing

### Day 3:

#### Encapsulation technology for active drug molecules with ultrasound technology

Encapsulation of bioactive drug molecule with ultrasound approach.

#### Role of ultrasound in emulsion preparation in pharmaceutical industries

Emulsion preparation, emulsion stability

### Day 4:

#### Pharmaceutical processes with ultrasound

Crystallization, emulsification, Potential of ultrasound in process intensification in pharmaceutical industries

### Day 5:

#### Scale up of Ultrasonic process

Hydrodynamic cavitation approach in scale up

#### Examination for Students

