NEWS LETTER

Centre for Nano Science and Technology (A.Y 2022-23)

Centre for Nano Science and Technology
Institute of Science and Technology
Jawaharlal Nehru Technological University Hyderabad

Dr. CH. Shilpa Chakra
Assistant Professor of Nanotechnology
& Head of the Department
CNST, IST, JNTUH

Greetings! Centre for Nano Science and Technology, JNTUH is delighted to release its newsletter. The world is undergoing a paradigm shift towards technology, energy, energy security and its applications. There are always factors that drive developments- new technologies and new requirements. Nanotechnology has far-reaching applications in various sectors.The academic year 2022-23 has been going with great zeal and more potential towards research and outreach activities for the external students. To train students and to adopt innovative approaches in Academic and Research. Centre has been offering M.Tech Nanotechnology and PhD in Nano Science and Technology since 2007. Faculty, Research Scholars and students have published about 12 publications in peer reviewed journals and SCI publications with good impact factor journals like Elsevier and science direct. Syllabus is revised in Feb 2023 with members from IICT, ARCI, UoH, Godi Energies, Nano Span India Pvt Ltd etc. Centre offered 02 Value added courses and encouraged students to take-up coursera. Faculty are actively mentoring students towards their career development. Faculty has 05 ongoing R&D Projects sponsored by DST-Woman scientist scheme (WOS-A),DST SEED, DST SERB, AICTE RPS. Faculty are interested to work latest energy storage like Hydrogen Generation and Storage.

About the Centre: The Center for Nano Science and Technology (CNST) at Jawaharlal Nehru Technological University Hyderabad (JNTUH) is a research center dedicated to the field of nanoscience and nanotechnology. JNTUH is a well-known technical university located in Hyderabad, Telangana, India. The CNST at JNTUH focuses on interdisciplinary research in the areas of nanoscience and nanotechnology, which involve studying

and manipulating materials and devices at the nanoscale level. Nanoscience is the study of phenomena and manipulation of materials at the atomic, molecular, and macromolecular scales, while nanotechnology deals with the design, fabrication, and application of nanoscale materials and devices. The center aims to promote research, development, and collaboration in nanotechnology by providing state-of-the-art facilities and infrastructure. It offers a platform for researchers, academicians, and students to engage in cutting-edge research, explore innovative ideas, and contribute to advancements in nanoscience and nanotechnology. The research activities at CNST may include the synthesis and characterization of nanomaterials, fabrication of nanodevices, investigation of their properties and behavior, as well as their applications in various fields such as electronics, medicine, energy, and environmental science. The CNST also encourages collaborative research and partnerships with industry, academia, and other research institutions to foster technology transfer and commercialization of nanotechnology-based innovations. Overall, the Center for Nano Science and Technology at JNTUH plays a vital role in advancing research, education, and development in the field of nanotechnology, contributing to scientific progress and technological advancements in India.

Vision:

The Centre is committed to provide postgraduate academic and research programs to produce high quality human resource with ability to meet the global challenges and to become a world leader in research and teaching of Nano Sciences and Materials to address the local, national and international societal needs for the betterment of mankind and train the young researchers/students for advances in nano and materials technology.

Mission:

Nanoscience and Technology programme aims to provide quality interdisciplinary science and engineering education with state-of-the-art infrastructural facilities, engaging outstanding scientists from different branches of science and engineering, encouraging them to carry out their individual scientific research, the graduates can advance the frontiers of knowledge in Nanotechnology by developing and transforming them through research and innovations with major thrust on the following areas: sensors, medical nanotechnology, agricultural nanotechnology, nanotechnology based solutions for energy and environment.

PROGRAM EDUCATIONAL OBJECTIVES (PEO'S):

- PEO1: Apply the scientific knowledge of Physics, Mathematics, Chemistry, and Engineering for deeper understanding of the matter at nanoscale.
- PEO2: Identify, formulate, research literature, and analyze advanced scientific problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PEO3: Design solutions for advanced scientific problems and design system components or processes.
- PEO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PEO5: Create, select, and apply appropriate techniques, resources, and modern scientific and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- PEO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional scientific practice.
- PEO7: Communicate effectively on complex Scientific/Technological activities with the Scientific/engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PEO8: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning.

Programme Outcomes (PO's) :

- PO1: Apply principles of basic science concepts in understanding, analysis and prediction of matter at Nano scale.

- PO2: To introduce interdisciplinary areas for interdisciplinary application of Science and engineering concepts.
- PO3: To introduce advanced ideas and techniques required in emerging areas in nanotechnology.
- PO4: To develop human resource with specialization in theoretical and experimental techniques required for career in academia and Nanotechnology driven industry.
- PO5: Engage in lifelong learning and adapt to changing professional and societal needs.

Program Specific Outcomes: (PSO's):

- PSO1: Understand and apply principles of physics, chemistry and engineering for understanding the scientific phenomenon in nano-domain.
- PSO2: Understand and apply Theoretical concepts on experimental learning of Nano-systems for describing and deeper understanding.
- PSO3: Provide exposure in various specialization of Nanotechnology
- PSO4: Provide exposure to advanced experimental/theoretical methods for measurement, observation, and fundamental understanding of phenomenon at nanoscale and nano-systems.
- PSO5: Engage in research and life-long learning to adapt to changing environment.

Strength, Weakness, Opportunity and Challenges(SWOC) :

Strengths:

- A variety of courses with adequate internal subject choice offered to students.
- Well-equipped state-of-art facilities and computer laboratories.
- Research oriented faculty with large number of publications in recognized journals.
- Appreciable IRG from R&D Projects and good number of Research journals published.
- Strong research, innovation culture for collaborative inter-disciplinary/multi-disciplinary research.
- Students' engagement in research studies leading to publications/patents/design-based projects and entrepreneurial ventures.
- Various projects has been given from the first year for understanding the nanoscience from hands on experience.

Weaknesses:

- Teaching faculty is working in ad-hoc capacity as the permanent position has not been filled in departments for a decade due to delay at the level of the State Government. Similar situation exists for non-teaching staff too.
- Inadequate levels of participation from foreign students for full time courses.

Opportunities:

- Improve peer reviewed journal publication (Scopus, citation index, impact factor, h-index).
- Introduction of an organized system of summer internship and industry exposure would enhance employability of the students.
- Enrolling students to online courses at Government of India Swayam Portal would enhance their learning.
- Utilization of UGC Swayam portal for MOOC courses.
- To train students to get better placement.

Challenges:

- Recruitment of permanent faculty (teaching as well as non-teaching).
- To initiate need-based and interdisciplinary courses.
- Blending appropriate MOOC courses with the current curriculum to add value
- Attracting core engineering company placements
- Keeping pace with global development in pedagogy and research

Syllabus Revised: **Yes**

Number of Programmes offered: 02

S. No.	Program Name	PG	Sanctioned intake	Year of starting	Regular/Self finance
1	M.Tech(Nano Technology)	PG	25 (18+7)	2007	Regular
2	Ph.D (Nano science and Technology)	Ph.D	-	2010	Regular & Part-Time

Academic Year	Program Name	Program Code	Number of seats sanctioned	Number of students admitted
2022-23	M.Tech (Nanotechnology)	D66	25	12

Vale Added Courses offered:

1. Selection of nanomaterials for energy systems (VAC 21)
2. Analytical characterization techniques (VAC 22)

Mentor-Mentee Details:

Mentor name	No. of mentee
Dr.CH Shilpa Chakra	04
Dr. K.Venkateswara Rao	04
D.Rakesh	04

Faculty Details:

S.No	Name of the Faculty	Designation	Qualification	Experience (Years)
1	Dr.K.Venkateswara Rao	Professor of Nanotechnology & Director of Evaluations, JNTUH	M.Sc., M.Tech.,Ph.D.,PDF Raman Postdoctoral fellow (2016-17),Johns Hopkins Medicine, USA	25
2	Dr.CH Shilpa Chakra	Assistant Professor of Nanotechnology & Head of the Department	B.Tech.,M.Tech.,Ph.D	12
3	Mr.D.Rakesh	Assistant Professor(Contract)	B.Tech.,M.Tech	12

R & D PROJECTS: 05 (DST-Woman scientist scheme (WOS-A),DST SEED, DST SERB, AICTE RPS)

Full time scholars with fellowship:

S.N	Name of the Full-Time Research scholar	Type of Fellowship	Name of the supervisor	Research area
1.	V. Sai Kumar	Research Assistantship (RA)	Dr.K.Venkateswara Rao	Electrochemical sensors
2.	S. Madhuri	Research Assistantship (RA)	Dr.CH Shilpa Chakra	Energy Storage
3.	T. Rakesh Kumar	DST-JRF/SRF	Dr.CH Shilpa Chakra	Supercapacitors
4.	K. Shireesha	DST-JRF/SRF	Dr.CH Shilpa Chakra	Supercapacitors
5.	CH. Harish	CSIR-UGC-NET	Dr.K.Venkateswara Rao	Energy applications
6.	Dr. Divya Velpula	DST-Woman scientist scheme (WOS-A)	Dr.CH Shilpa Chakra	Electrochemical applications

Part-time scholars:

S.N	Name of Research scholar	Name of the supervisor	Research area
1.	S. Sasirekha	Dr. K Venkateswara Rao	Nano Lithium batteries
2.	A.Saineeta	Dr. K Venkateswara Rao	Gas sensors
3.	Neetu Rani.P	Dr. K Venkateswara Rao	Gas sensors
4.	N.Anasuya	Dr.K.Venkateswara Rao	Nanostructures for Supercapacitor applications

No of Paper publications: 15

No. of Patents Filed/Awarded: 03

No of Workshop/Conferences/seminars Attended: 23

No of Books published: 02

No of Class rooms: 01

List of ICT enabled tools: LCD Projector, LED TV, Desktop Computers with LAN facility

Total No of computers in simulation Lab: 13

HET WORKSHOP- 2023 :

Abroad visit by Faculty (Nanyang Technological University, Singapore):

OUT REACH PROGRAMS:

- **External students Hands-on-training on sophisticated equipment's**

Research Outcomes:

1. Research focused on the synthesis, characterization, and applications of novel nanomaterials, such as nanoparticles, nanowires, nanotubes, and thin films. Potential outcomes could include advancements in fabrication techniques, improvements in material properties, or the development of new applications in fields like electronics, energy, medicine, or environmental engineering.
2. Nanomaterials for Energy Application research involved in the development of nanomaterials for energy harvesting, storage, and conversion. Outcomes might include improvements in energy efficiency, advancements in energy storage devices (such as batteries or supercapacitors).
3. Development and refinement of techniques for characterizing nanoscale materials and structures.

Best Practices:

1. Updated with latest research on current advancements and emerging trends in the field of nanotechnology. Regularly followed scientific journals, attended conferences, and engage with your peers and professors to stay informed about the latest research outcomes and methodologies.
2. Planned time wisely to balance coursework, research. Created a schedule that allows for dedicated research time, coursework completion, and regular progress updates
3. Engaged in discussions, attend seminars, and participate in research groups to broaden your knowledge and gain different perspectives on nanotechnology.. Enhanced research skills by acquiring hands-on experience with state-of-the-art equipment and techniques used in nanotechnology.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

Kukatpally, Hyderabad - 500 085, Telangana State, India
website:www.jntuh.ac.in