NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

DEPARTMENT OF PHYSICS

ACADEMIC EXCELLENCE • RESEARCH • INNOVATION



Scan here for Department Website

Prof. Bidyadhar Subudhi

Director

NIT Warangal

“ GROWTH ENABLED THROUGH TEAM SPIRIT! ”

About NIT Warangal

One of India's premier National Institutes of Technology.

Established in 1959 as Regional Engineering College (REC).

Recognized for excellence in engineering, science, and research.



National Institute of Technology, Warangal

Overview of the Department

- The Department of Physics was established in 1959.
- Supports undergraduate, postgraduate, and doctoral education.
- The first department to produce a Ph.D. at REC Warangal.
- Offers two courses: M.Sc.(Tech) Engg Physics (Photonics & Electronics) and Integrated M.Sc.
- Good placement rate of Photonics & Electronics M.Sc. Tech.
- Offers teaching of the mandatory Engg. Physics to 1st year B.Tech students.
- Integrated BSc-B.Ed. Courses.
- Specially designed Open electives and other subjects to B.Tech, M.Tech.
- Produces around 10 PhDs and more than 100 SCI Journal papers per annum.

CURRENT FACULTY STRENGTH

22

8 Profs + 7 Associate Profs + 7 Asst Profs

Thrust Research Areas

Material Sciences:

Energy harvesting, Energy Storage, Glasses and Glass Ceramics, Biomaterials, Luminescence, Thermoelectric, 2D materials, OLEDs, PV, Perovskite Solar Cells, LCD, Microfluidics**, .**

Photonics:

Optical System Design, Beam Optics, Fiber Optics, Lasers.

Theoretical Physics:

Theoretical & Computational Physics and other frontier areas.

Vision & Mission

Vision of the Department

Be on the forefront of applied research and dissemination of knowledge combining Science and Engineering perspectives.

Mission of the Department

Develop the scientific insight and technical competence of the students for keeping abreast with the advancements in Science and Technology to meet the demands of Industry and Research.



Department of Physics,
Third and Fourth floors,
Science and Metallurgy Building

ACADEMIC CAPACITY

Sanctioned Student Strength

Approved intake distribution across academic & research programs

Department of Physics
National Institute of Technology Warangal

POSTGRADUATE

M.Sc. Tech

60
Sanctioned Seats

INTEGRATED

Integrated M.Sc.

20
Sanctioned Seats

DUAL DEGREE

B.Sc. B.Ed.
Physical Science

20
Sanctioned Seats

RESEARCH

Ph.D. Program

73 Scholars

49	24
Regular (R)	Part-Time (P)

TOTAL SANCTIONED CAPACITY
173 Total Student Seats

Department of Physics, NIT Warangal (NITW)

Executive Summary

Department Performance at a Glance

16 MoUs Signed Academic & Industry Collaborations

22 Faculty Members Core Teaching & Research Team

INR 9 Cr R & D Projects Funded Research Capital

INR 26 Lakhs Consultancy Industry Engagement & Advisory

15 Academic & Research Labs State-of-the-art Infrastructure

337 + 12 Publications & Patents 337 Publications | 12 Patents

FACULTY DIRECTORY - Meet Our 'Nation Builders'

The vibrant faculty team powering education & scientific research



Prof. Sourabh Roy
Head of the Department
physics_hod@nitw.ac.in

Name	Designation
Prof. T. Venkata Appa Rao	Professor
Prof. Abdul Azeem	Professor
Prof. P. Syam Prasad	Professor
Prof. Sourabh Roy (HOD)	Professor
Prof. K. Thanga Raju	Professor
Prof. D. Haranath	Professor
Prof. Kusum Kumari	Professor
Prof. V. Jayalakshmi	Professor
Prof. D. Paul Joseph	Associate Professor
Prof. R. Rakesh Kumar	Associate Professor
Prof. R. Arun Kumar	Associate Professor

Name	Designation
Prof. K. Uday Kumar	Associate Professor
Prof. Vijay Kumar	Associate Professor
Prof. Surya K. Ghosh	Associate Professor
Prof. Aalu Boda	Associate Professor
Prof. Hitesh Borkar	Asst. Professor
Prof. Sanyukta Ghosh	Asst. Professor
Prof. Srinivas Gandla	Asst. Professor
Prof. Bommareddy Poojitha	Asst. Professor
Prof. Sanjib Nayak	Asst. Professor
Prof. Pawan Singh	Asst. Professor
Prof. Satya Veer Singh	Asst. Professor

Our vibrant team of teaching faculty



Prof. Sourabh Roy

Professor and Head

PhD: IIT Kharagpur

Specialization:

Photonics, Fiber optic sensor design



Prof. T Venkatappa Rao

Professor

PhD: Kakatiya University Warangal

Specialization:

Glass ceramics, Nano materials, Radiation Physics



Prof. P. Abdul Azeem

Professor

PhD: Sri Krishnadevaraya University

Specialization:

Glass science, Biomaterials, Luminescent devices



Prof. P. Syam Prasad

Professor

PhD: Acharya Nagarjuna University

Specialization:

Bioactive materials, Nano materials

Our vibrant team of teaching faculty



Prof. K. Thangaraju

Professor

PhD: Anna University

Specialization:

Hybrid UV photodetectors, Organic LEDs



Prof. D. Haranath

Professor

PhD: Shivaji University

Specialization:

2D materials, Cool coatings, Luminescence



Prof. Kusum Kumari

Professor

PhD: Indian Institute of Technology Delhi

Specialization:

Supercapacitors, Solar cells



Prof. V. Jayalakshmi

Professor

PhD: Centre for Nano and Soft Matter Sciences, Bangalore

Specialization:

Biosensing, Gas sensors, Soft actuators

Our vibrant team of teaching faculty



Prof. D. Paul Joseph

Associate Professor

PhD: University of Madras

Specialization:

Magnetic Materials, Photo catalysis



Prof. R. Rakesh Kumar

Associate Professor

PhD: Indian Institute of Science

Specialization:

Triboelectric generators, Energy Harvesting



Prof. R. Arun Kumar

Associate Professor

PhD: Anna University

Specialization:

Optical Materials and Sensors, LEDs



Prof. K. Uday Kumar

Associate Professor

PhD: Indian Institute of Technology Madras

Specialization:

2D Materials, Electrochromics, Energy Harvesting

Our vibrant team of teaching faculty



Prof. Vijay Kumar

Associate Professor

PhD: University of Hyderabad

Specialization:

Intelligent Optics, Deep Learning, Quantum Optics



Prof. Surya Kanta Ghosh

Associate Professor

PhD: Indian Institute of Technology Bombay

Specialization:

Biophysics, Soft Matter, Statistical Mechanics



Prof. Aalu Boda

Associate Professor

PhD: University of Hyderabad

Specialization:

Density Functional Theory, Theoretical Physics

Our vibrant team of teaching faculty



Prof. Hitesh Borkar

Assistant Professor

PhD: AcSIR CSIR NPL New Delhi

Specialization:

Electronic, and magnetic materials



Prof. Sanyukta Ghosh

Assistant Professor

PhD: Indian Institute of Science

Specialization:

Electronic transport modelling, Thermoelectrics



Prof. Srinivas Gandla

Assistant Professor

PhD: Indian Institute of Technology Bombay

Specialization:

Deformable electronics, Pulsed laser processing



Prof. Bommareddy Poojitha

Assistant Professor

PhD: IISER, Bhopal

Specialization:

Condensed Matter Physics, Raman Spectroscopy

Our vibrant team of teaching faculty



Prof. Sanjib Nayak

Assistant Professor

PhD: Indian Institute of Technology Guwahati

Specialization:

Condensed Matter Physics and Materials Science



Prof. Pawan Singh

Assistant Professor

PhD: Babasaheb Bhimrao Ambedkar University

Specialization:

Optics and Photonics



Prof. Satyaveer Singh

Assistant Professor

PhD: Indian Institute of Technology (BHU)

Specialization:

Semiconductors for flexible electronic devices



Dr. Dhruba Jyoti Biswas

Professor of Practice

(Retired Scientist, BARC)

Core Research Groups

Advanced Functional Materials

Design, synthesis, and nanoscale characterization of smart materials, 2D structures, and biomaterials for next-generation applications.

Nanotechnology | 2D Materials | Smart Polymers

Sustainable Energy & Semiconductors

Pioneering high-efficiency photovoltaics, wide-bandgap semiconductor devices, and solid-state energy storage solutions.

Photovoltaics | Semiconductors | Energy Storage

Optics & Photonics

Exploring light-matter interactions, quantum optics, ultrafast laser systems, and advanced optical sensing platforms.

Laser Physics | Quantum Photonics | Fiber Optics

Theoretical & Computational Physics

Ab initio simulations, quantum field modeling, and machine learning methods applied to complex condensed matter systems.

Quantum Simulation | DFT Modeling | Machine Learning

Academic & Research Activity Co-ordinators

DEPARTMENT ACADEMIC PROGRAM COMMITTEE

Prof. K. Thanga Raju

Chairman

RESEARCH GROUPS & LEADERS

Advanced Functional Materials

16 Members

Co-ordinator — Prof. Abdul Azeem

Sustainable Energy & Semiconductor Devices

13 Members

Co-ordinator — Prof. D. Haranath

Optics & Photonics

08 Members

Co-ordinator — Prof. Sourabh Roy

Theoretical & Computational Physics

02 Members

Co-ordinator — Prof. Surya K. Ghosh

CENTRE OF EXCELLENCE

Glass Science & Technology

Co-ordinator: Prof. Abdul Azeem

RESEARCH & ACADEMICS

Doctoral Program Overview

Comparative breakdown of Ph.D. completions and active research scholars

3-Year Performance Metric

DEGREES AWARDED

42 Ph.Ds Awarded

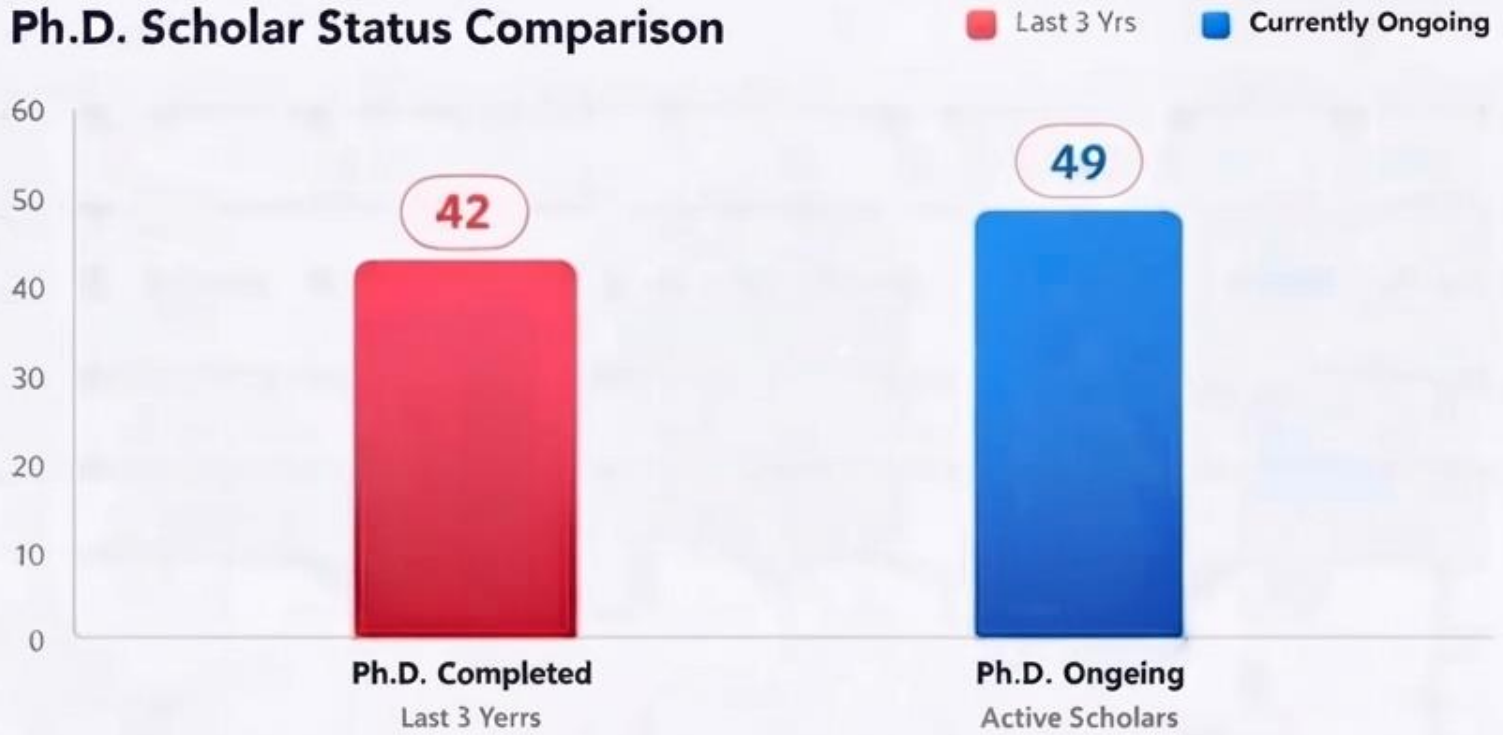
CURRENT ENROLMENT

49 Ph.Ds Ongoing

TOTAL SCHOLARS ENGAGED

91 Total Research Candidates

Ph.D. Scholar Status Comparison



Key Insight: Research output remains strong with **42** graduates over the past 3 years, while a vibrant pipeline of **49** active scholars guarantees continued academic momentum.

Books Published

Authored and edited academic publications in advanced materials and technologies

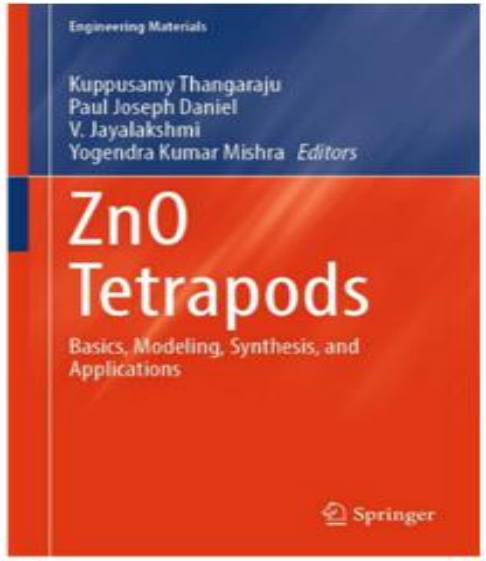


Proceedings of the International Conference on Emerging Multifunctional Materials

Dr. D. Paul Joseph, Dr. K. Thangaraju and Dr. V. Jayalakshmi (Eds.)

Springer Nature (Singapore)

ISBN: 978-981-96-5862-6

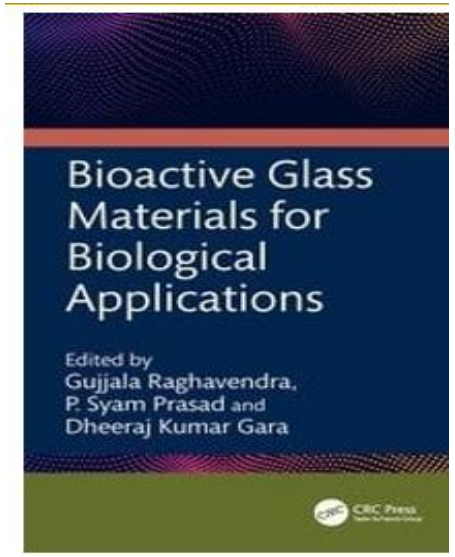


ZnO Tetrapods: Basics, Modeling, Synthesis, and Applications

Dr. K. Thangaraju, Dr. D. Paul Joseph

Project) Springer Nature (SPARC)

ISBN: 978-981-95-1613-1



Bioactive Glass Materials for Biological Applications (1st Ed.)

Dr. Gujjala Raghavendra,
Dr. P. Syam Prasad

CRC Press

ISBN: 978-1040422427

Research Publications & Impact

Comprehensive overview of high-impact journal and conference contributions

2023-2025

337
International Publications

126
Conference Proceedings

Journal Quartile Breakdown

337 Papers



97% of international publications are in high-ranked **Q1 & Q2 journals**.

Key Featured Publications & Journals

Selected Top Venues

NATURE PORTFOLIO
Nature Communications
Top Tier Q1

APS PHYSICS
Physical Review B
Premier Q1

NATURE PORTFOLIO
Scientific Reports
Q1 High Impact

ACS PUBLICATIONS
ACS Applied Nano Materials
Q1 Journal

ELSEVIER
Journal of Power Sources
Q1 Journal

WILEY / VCH
Small (Nano Micro)
Q1 Journal

ROYAL SOC. CHEMISTRY
J. Materials Chemistry C
Q1 Journal

ELSEVIER
Materials Today Physics
Q1 Journal

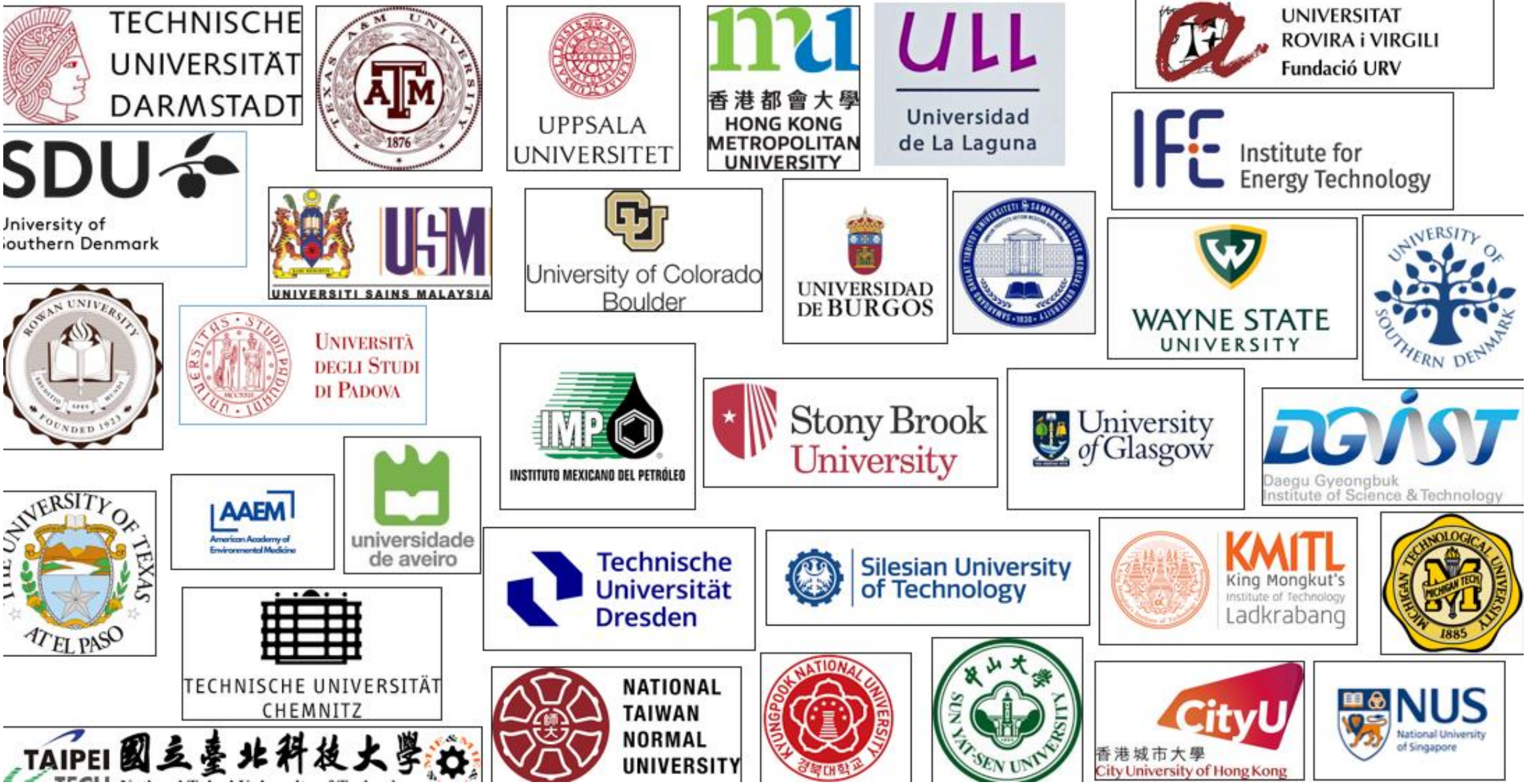
IEEE SENSORS
IEEE Sensors Journal
Q1 Journal

ELSEVIER
Journal of Energy Storage
Q1 Journal

OPTICA / ELSEVIER
Optics Letters
Q1 Journal

ELSEVIER
Materials Sci. & Eng. R
Q1 Review

International Academic Collaborations



National Academic Collaborations



Industry Collaborations

Strategic partnerships driving research, development, and technological innovation

DRDO
DEFENCE R&D ORGANISATION
MINISTRY OF DEFENCE
CHESS

ANANTH TECHNOLOGIES

LASER SCIENCE
Bringing Tomorrow's Technology Today

EMERSON

NANO
Nuclear Energy Inc.

net zero nuclear

भारत इलेक्ट्रॉनिक्स
BHARAT ELECTRONICS
QUALITY. TECHNOLOGY. INNOVATION.



RED APPLE
TECHNOLOGIES





Jyothi Technologies
We Glow In The Dark

NUCLEONIX SYSTEMS PVT LTD INDIA
Manufacturers and suppliers of Nuclear Instruments & Systems

NNCRYSTAL US CORPORATION

Projects Portfolio Overview

Tracked ongoing and completed capital projects over the last 3 years

3-YEAR REVIEW

TOTAL PROJECTS
37 (₹17.06 Cr)

COMPLETED PROJECTS
16 (₹8.12 Cr)

ON-GOING PROJECTS
21 (₹8.94 Cr)

Project Value Comparison

Values in Crores (₹)



Portfolio Summary Breakdown

PROJECT STATUS	NUMBER	TOTAL AMOUNT
Completed	16	₹8.12 Cr
On-Going	21	₹8.94 Cr
Total Portfolio	**37**	₹17.06 Cr

Data reflects all ongoing and completed projects within the past 3 fiscal years.

Patents Portfolio Overview

Summary of recently granted national & international patents

Total Patents 22

GRANTED (FEATURED)
8 Patents

KEY HIGHLIGHTS
US & Indian Grants

CORE DOMAINS
ML, Sensors, Nanotech

SL.	TITLE OF PATENT	INVENTOR/S NAME	APPLICATION NO.	GRANT DATE	GRANT NUMBER
1	All-In-One OzoNiT Muitipurpose Disinfection Unit	D. Haranath, Siju Mishra, R. Rakesh Kumar, D. Dinakar	202241068798	19.04.2024	533731
2	Industrial Waste Supercapacitor for Active Material	Pooja Yadav, P. Abdul Azeem, Sushil Patel et al.	202441041017	30.08.2024	202441041017
3	Fingerprint Classification Method using Machine Learning	D. Haranath, Payal Pradhan, Aryaputra P Das	202441080126	22.10.2024	202441080126
4	Method for Luminescence Sensing using Machine Learning	D. Haranath, M. Rakshitha, A. Gopi Krishna, D. Jaya Krishna	202441096431	13.12.2024	202441096431
5	Health Monitoring Triboelectric Nanogenerator	Prakash Kodali, Bochu Lakshakot, Rakesh Kumar R, et al.	202441029719	19.04.2024	16/2024
6	Stepmate Carryframe for Trokey Bags	Gujjala Raghavendra, Shakuntala Ojha et al.	403652-001	22.03.2024	403452-001
7	Polar-Resistive Humidity Sensor (Low Cost & High Sensitivity)	Hitesh Borkar	201711040726	2024	201711040726
8	Multi-States Nonvolatile Opto-Ferroelectric Memory Material	Hitesh Borkar	US10,115,456 B2	2024	US10,115,456 B2

Data updated for recent calendar year grant notifications.

Patents & Publications

Summary of Granted & Published Intellectual Property Rights

6 Patents Listed

#	APPLICATION NO.	INVENTOR(S) NAME	TITLE OF THE PATENT	PUBLISHED / GRANTED DATE	PUBLICATION / GRANTED NO.
09	German Patent 20 2023 102 031	Arunachalam Geetha, Baskar Leena, D. Paul Joseph, G. Murugadoss, M. Kovendhan, P. Rekha, R. Rathika, S. Divyadharshini	**A system for producing copper incorporated tungsten oxide nanoparticles for performing photocatalytic degradation and seed germination studies**	22-06-2023	Gebrauchsmusters Nr. 20 2023 102 031
10	South African Patent No. 2023/02629	K. Manavalan, D. Paul Joseph, J. Maria Fernandes, R. Rajendran, R. Pachaiappan, S. Babu Kotikala, Purusotham Reddy N, M. Reddivari	**Vanadium pentoxide-tin (V_2O_5-Sn) mesh electrode system and a method for developing an inverted polymer solar-cell thereof**	31-05-2023	Patent No. 2023/02629
11	South African Patent No. 2023/02263	D. Paul Joseph, M. Kovendhan, D. Babu Padmanaban, M. Periyasamy, C. Venkateswaran	**A method for ultra-fast formation of CrO_2 at ambient conditions**	31-05-2023	Patent No. 2023/02263
12	South African Patent No. 2023/02819	D. Paul Joseph, M. Kovendhan, C. Surya Prakasarao, A. Kumar Raju, P. Hazarika, D. Dsouza Slavia	**A system for Bending and twisting of ultra-thin films coated on a flexible substrate**	31-05-2023	Patent No. 2023/02819
13	202241064187	V. Jayalakshmi, G. Buchaiah, T. Arunkumar, Sr. D. Saikat, Ms. S. P. Ramadevi	**Development of bile acids detection biosensor based on cholesteric liquid crystal droplets**	18-11-2022	202241064187
14	US2019137690A1 CA3048609A1 201847045629A	Shankar Pidishety, Balaji Srinivasan, Gilberto Brambilla	**Fused Fibre Couplers, and Apparatuses and Methods for The Manufacture and Use Thereof**	04-10-2022 29-08-2023 28-03-2024	US11460638B2 CA3048609C 530923

Department of Physics — R&D Executive Summary

NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

3-Year Review (2021-2024)

Sponsored Projects
₹17.06 Cr 37 Total Projects
(21 Ongoing)

Patents Portfolio
22 Patents
8 Granted
(incl. US Grant)

Publications
350+ Papers High Impact
SCI / Scopus

Ph.D. Degrees
42+ Awarded
65+ Active Research Scholars

Research Funding & IP Portfolio Breakdown

CapEx & Grants

On-Going Projects (21) ₹8.94 Cr (52.4%)



Completed Projects (16) ₹8.12 Cr (47.6%)



KEY SPONSORING & FUNDING BODIES

DST | SERB | DRDO | ISRO | CSIR | DAE-BRNS

Key Thrust Areas & Innovations

Tech Domains

Energy Storage & Nanogenerators
Supercapacitors using industrial waste, Triboelectric health monitoring sensors, bio-materials.

Photonics & Luminescence Sensing
ML-driven luminescence sensing, opto-ferroelectric nonvolatile memory (US Patent), sensors.

Applied Healthcare Devices
OzoNIT All-in-One disinfection unit, ML fingerprint classification, polar-resistive humidity sensors.

List of Academic Laboratories (UG)

Undergraduate Program • Faculty & Instructor Batch Allocations

17 Batches / Groups

SL. NO.	NAME OF LAB	PROGRAM, YEAR	INSTRUCTORS
1	Engineering Physics Lab	1st Year B.Tech — All Branches	Prof. Syam Prasad, Prof. Sanyukta Ghosh
2			Prof. Srinivas Gandla, Prof. Sourabh Roy
3			Prof. Uday Kumar
4			Prof. R. Arun Kumar
5			Prof. Aalu Boda
6			Prof. Uday Kumar, Prof. Aalu Boda
7			Prof. Vijay Kumar, Prof. Pawan Singh
8			Prof. Uday Kumar, Prof. Aalu Boda
9			Prof. Sanyukta Ghosh, Prof. Aalu Boda, Prof. Shankar Pidishety
10			Prof. Kusum Kumari, Prof. Satya Veer Singh
11			Prof. Paul Joseph, Prof. Pawan Singh
12			Prof. Paul Joseph, Prof. R. Arun Kumar
13			Prof. Aalu Boda, Prof. Paul Joseph
14			Prof. Uday Kumar
15			Prof. Sanyukta Ghosh, Prof. Aalu Boda
16			Prof. Surya Kanta Ghosh, Prof. Paul Joseph
17			Prof. Srinivas Gandla, Prof. Aalu Boda, Prof. Sanjib Nayak

List of Academic Laboratories (PG)

Post-Graduate & Integrated Programs • Faculty & Instructor Allocations

15 Laboratory Batches

S. No.	Name of Lab	Program, Yr, Sem
1	Transducer Technology Lab (1 & 2)	I Year M.Sc. (Tech)
2	Solid State Physics Lab (1 & 2)	I Year M.Sc. (Tech)
3	Electronics Devices & Circuits Lab (1 & 2)	I Year M.Sc. (Tech)
4	Solid State Physics Lab (3)	IV Year Integrated M.Sc.
5	Atomic & Molecular Physics Lab	IV Year Integrated M.Sc.
6	Digital System Design Lab	II Year M.Sc. (Tech)
7	Microprocessors & Interfacing Lab	II Year M.Sc. (Tech)
8	Optical System Design Lab	II Year M.Sc. (Tech)
9	Optical Instrumentation Lab	II Year M.Sc. (Tech)
10	Heat & Thermodynamic Lab	I Year B.Sc. - B.Ed
11	Electricity & Magnetism Lab	II Year B.Sc. - B.Ed
12	Modern Physics Lab	III Year B.Sc. - B.Ed
13	Heat & Thermodynamic Lab	I Year Integrated M.Sc.
14	Electricity & Magnetism Lab (1 & 2)	II Year Integrated M.Sc.
15	Advanced Physics Lab -1 & 2	III Year Integrated M.Sc.

List of Academic Laboratories (PG)

S. No.	Name of Lab	Program, Yr, Sem
1	Mechanics Waves & Oscillation Lab	Int. MSc, 1st Year
2	Optics Lab	Int. MSc, 2nd Year
3	Basic Electronics	Int. MSc, 3rd Year
4	Switching Theory and Logic Design Lab (1 & 2)	II Year M.Sc. (Tech)
5	Computer Programming Lab (1 & 2)	II Year M.Sc. (Tech)
6	Optoelectronics Lab (1 & 2)	II Year M.Sc. (Tech)
7	Optical Physics - Lab - (1, 2)	Int. MSc, 1st Year
8	Optical Physics Lab	Int-MSc, 7th Sem
9	Network Analysis Lab (1 & 2)	I Year M.Sc. (Tech)
10	Linear Integrated Circuits Lab-1, 2	I Year M.Sc. (Tech), 9th Sem Int. MSc

Research Equipment



FIELD EMISSION SCANNING ELECTRON MICROSCOPE (FE-SEM)

Electrospinning unit



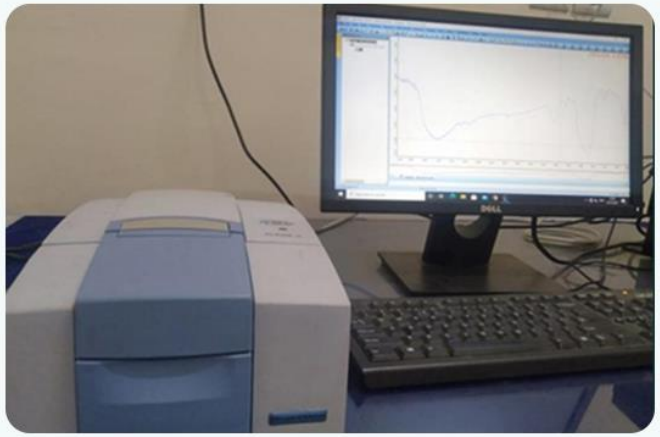
SR 570 Low noise current preamplifier



Keithely 2401, 2450 Source meter (I-V) measurements



Bruker FTIR Alpha Spectrometer



Zeta Potential and Particle Size analyzer



Research Equipment

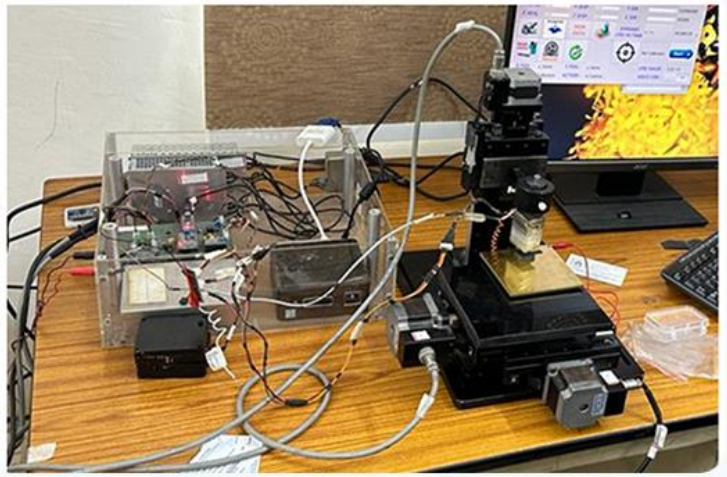
Micro puller



Fully automated Room temperature and temperature-dependent Dielectric measurement Unit (up to 1000 oC)



Kelvin Probe Microscope



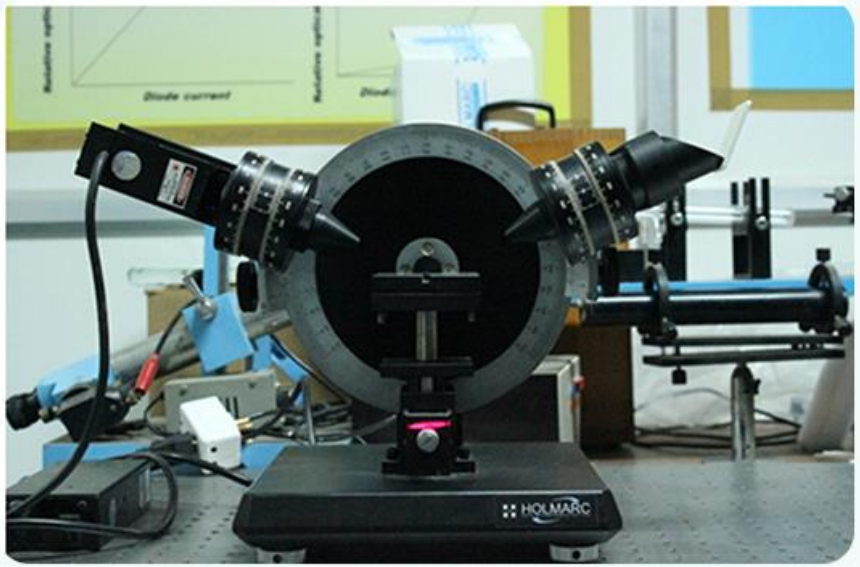
Programmable spin-coater for thin film deposition



Thermal Evaporation system



Ellipsometer



Student Chapters & Societies

Active Societies

- Physics Society
- OPTICA Student Chapter
- SPIE Student Chapter

Activities & Events

- School outreach program
- Expert lectures & Exhibitions
  Industry visits
- Scientific quiz & competitions
- Cultural activities



Physics Society Inauguration















Ph.D. Student Achievements

Research scholars in the Department of Physics consistently gain recognition on national and international platforms through fellowships, grants, and awards:

- Securing international Travel Grants
- Best Poster and Oral Presentation Awards in National & International conferences
- Best Theses Awards
- National and International Post-Doctoral Fellowships
- Short-term student visit programs



Ms. Vrinda Garg, Ph.D. scholar, was awarded International Travel Grant from ANRF, GoI, to deliver a scientific talk and present a poster at the American Physical Society Global Physics Summit: March Meeting, 2025, California, USA.



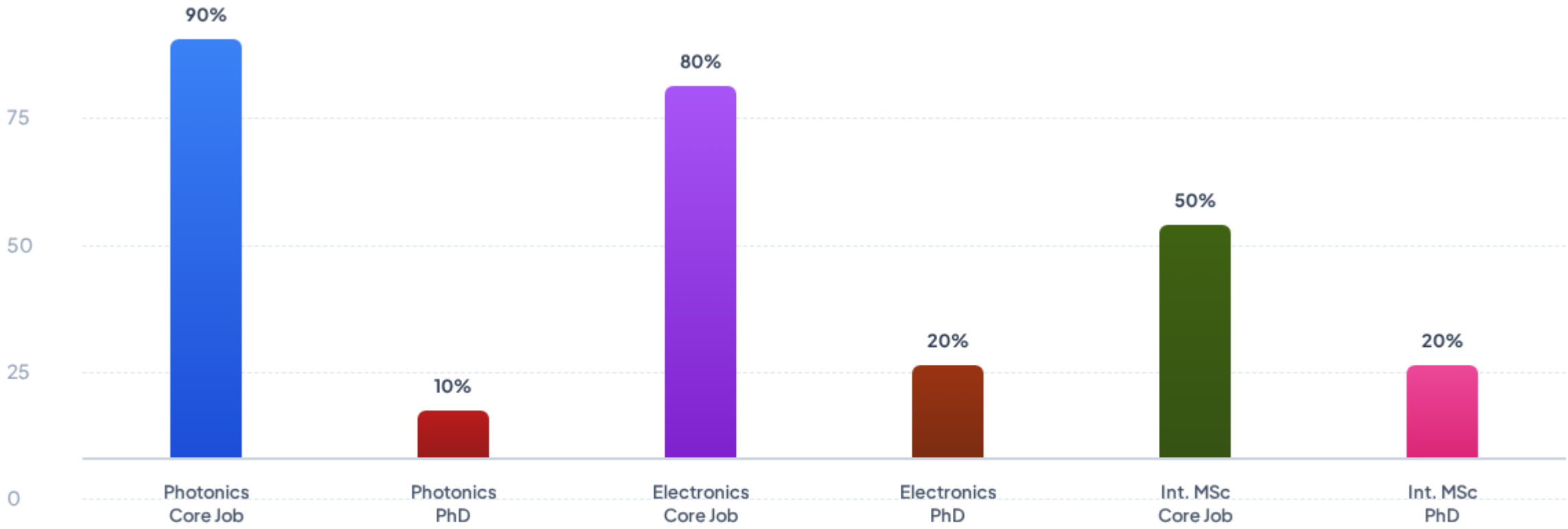
Mr. Baburao Simma, Ph.D. scholar, was awarded with the Best Poster Award at the DAE Solid State Physics Symposium (DAE-SSPS 2024), organized by BARC Mumbai.



Visit of Research scholars to University of Southern Denmark

Placement Statistics of PG Courses

Comprehensive overview of employment vs. higher research pursuits across postgraduate disciplines



Key Takeaway: Core industry placements lead across Photonics and Electronics postgraduate streams, whereas Integrated MSc graduates demonstrate a balanced distribution between corporate placement and doctoral research.

National Academic Collaborations

Key research partnerships and institutional fellows across premier Indian organizations (IITs, IISc, JNU, and National Institutes)

S. No	Collaborator	Institution
1	Prof. P. Murugavel	Indian Institute of Technology Madras
2	Prof. Dipti Gupta	Indian Institute of Technology Bombay
3	Prof. Pavan Pujar	Indian Institute of Technology (BHU)
4	Prof. Ravindra Bukke Naik	Indian Institute of Technology Madras
5	Prof. Mahesh Kumar	Indian Institute of Technology Jodhpur
6	Prof. Rudra Sekhar Manna	Indian Institute of Technology Tirupati
7	Prof. Subhash Thota	Indian Institute of Technology Guwahati
8	Prof. Satyender Kumar	Jawaharlal Nehru University

S. No	Collaborator	Institution
9	Prof. Kuldeep Singh	Central Electrochemical Research Institute
10	Prof. Ayan Roy	Indian Institute of Technology Kharagpur
11	Prof. Mukesh Kumar	Indian Institute of Technology Ropar
12	Prof. Ramesh Chandra Majik	Indian Institute of Science Bangalore
13	Prof. Surajit Saha	IISER Bhopal
14	Prof. Tanmay Maiti	Indian Institute of Technology Kanpur
15	Prof. Subrata Das	NIIST
16	Prof. G. Murugadoss	Sathyabama Institute of Science and Tech.

Research Network: Robust cross-institutional collaborations with premier national institutes driving advancements in material science, physics, and engineering research.

International Academic Collaborations

Global institutional partnerships and research fellows across 14+ countries



No	Collaborator	Institution	Country
1	Prof. S. Ghorai	Technical Univ. of Darmstadt	Germany
2	Prof. A. M. Padhan	Texas A&M University	USA
3	Prof. P. Swedlinah	Uppsala University	Sweden
4	Prof. Vaskuri C. S. Theja	Hong Kong Metro. Univ.	Hong Kong
5	Prof. Victor Lavin	Universidad de La Laguna	Spain
6	Prof. Xavier Lopez	Universitat Rovira i Virgili	Spain
7	Prof. Smagul Karzhanov	Institute for Energy Tech.	Norway
8	Prof. Pung Swee Yong	Universiti Sains Malaysia	Malaysia
9	Prof. Li-Fang Wang	Kaohsiung Medical Univ.	Taiwan
10	Prof. Santiago Aparicio	University of Burgos	Spain
11	Prof. Hongbo Liu	Instituto Mexicano del Petroleo	Mexico
12	Prof. K. V. Ramanujachary	Rovian University	USA
13	Prof. Maysara K. Salakhitdinova	Samarkand State Univ.	Uzbekistan

No	Collaborator	Institution	Country
14	Prof. Eesan E. Shaheen	Univ. of Colorado Boulder	USA
15	Prof. C. V. Ramana	Univ. of Texas at El Paso	USA
16	Prof. Leela Mohana Reddy	Wayne State University	USA
17	Prof. Rudolf Holze	TU Chemnitz	Germany
18	Prof. John B. Parise	Stony Brook University	USA
19	Prof. Yogendra Kumar Mishra	Univ. of Southern Denmark	Denmark
20	Prof. Anindya Nag	TU Dresden	Germany
21	Prof. Gaurav Khandewal	University of Glasgow	UK
22	Prof. Chi-Ching Kuo	National Taipei Univ. of Tech.	Taiwan
23	Prof. Krystian Misiewicz	Silesian Univ. of Tech.	Poland
24	Prof. Hoe Joon Kim	DGIST	South Korea
25	Prof. Dae Sung Lee	Kyungpook National Univ.	South Korea
26	Prof. Naratip Vittayakorn	KMITL	Thailand

Global Reach: Active collaborative research spanning top-tier international institutions across North America, Europe, Asia, and the UK.

No. of PhDs Awarded in Last 3 Years

S.No	Name of the Scholar	Roll / Reg. Number
01	Pooja Sharma	602223
02	Sonal Sahai	602224
03	Sayali Mishra	20161109
04	Swati Bishnoi	100221
05	Achu Chandran	3CEfE1432007
06	G Shwati	20EE15A32014
07	Vishnu V Jaiswal	718163
08	Saja Mishra	719165
09	Vikas	2K19/Ph.D. /AP. 02
10	M Rakshita	721104
11	NK Chaitanya P	717163
12	P.M. Pratheeksha	714050
13	N. Purushotham Reddy	717052
14	R. Muniramaiah	701966
15	Vinida Garg	21PYFJ166
16	Jitesh Pani	21PYFJ165
17	S. P. Ramadevi	701967
18	Mr. Rajuwara Rao Naikik	700975
19	Mr. Venkata Reddy Mamidi	701321
20	Mr. Ashish Kumar	716053
21	Mr. Allam Akshayakanth	717161

S.No	Name of the Scholar	Roll / Reg. Number
22	Mr. M. Jaya Rambabu	719112
23	Mr. Kaithe Rajula	717054
24	Ms. Saraswathi Kalilasa	21PYREP02
25	T. Lavanya	719111
26	Supriya Potu	701965
27	Ms. Kachu Anusha	21PYJF162
28	S. C. Rakesh Roshan	719109
29	Lalsingh Guguloth	715084
30	Nagaraju Macherd	716187
31	V. P. Mahorima	717055
32	Ramesh Baroth	717053
33	A. Mahalakshmi	719110
34	Anjaly Babu	721101
35	Punnsai Singh Badavath	721100
36	Nikhil Vangety	719106
37	Uma Chandi	716056
38	Radhika	717164
39	Krishna m Raju	718073
40	Sushil patel	719108
41	Satish Jain	701923
42	Pooja Yadav	720108

Ongoing Research Projects

Prof. D. Haranath

INR 24.00 Lakhs | 2021–2026

Mentor : SRIC ID: RS-1115 | Sponsored by: DST-INSPIRE | Narrow-Band UVA, UVB and Blue Light Emitting Phosphor Based Devices for Phototherapy

Prof. Paul Joseph

INR 42.72 Lakhs | 2023–2025

(PI) :Sponsored by: SPARC, Govt of India | 3D Hybrid Nanotetrapod Nanomaterials based Sustainable Optoelectronic Technologies

Prof. Kusum Kumari

INR 65.00 Lakhs Total | 2024–2027

1. (PI) INR 31 Lakhs (ANRF EMEQ 2023): Enhancing Hybrid Solar Cell Performance through Additive Engineering utilizing $CsPbI_3$ and $FAPbI_3$ Perovskite Quantum Dots.
2. (PI) INR 34 Lakhs (ANRF Core Research Grant 2023): Efficient, Stable and Scalable Perovskite Solar Cells using CdSe/ZnS and CdSe/ZnTe/ZnS Colloidal Quantum Dots as Hole Extraction Layer.

Ongoing Research Projects

Prof. V. Jayalakshmi

Multiple Grants

1.(PI) INR 37,40,000 (DBT): Design & Development of Cost-effective Label-free Detection of Alzheimer’s Biomarkers using Liquid Crystals; Duration: Completed in December.

2.(PI) INR 86,57,440 (ANRF ARG): Multi-Stimuli Responsive Behavior of Liquid Crystal Elastomers for Soft Robotics & Smart Actuators with IoT-enabled Integration; Sanctioned - Fund Release Awaited.

3. (CO-PI) INR 30,95,600 (ISRO/RESPOND): Cryo Temperature Measurement Using Fibre Based Sensors; Duration: 2 Years (Ongoing).

4. (CO-PI) INR 45,00,000 (SPARC): Hybrid Tetrapod Nanomaterials Based Sustainable Optoelectronic Technologies; Duration: 2.8 Years (Ongoing).

Prof. R. Rakesh Kumar

36 Months

(PI) INR 30,84,500 ponsor: BRNS (59/14/06/2024) | Development of high-performance triboelectric nanogenerator based on 2D MoS2@Metal organic framework Hybrid films for self-powered IoT systems, Commencement: 06-09-2024, Status: Ongoing

Ongoing Research Projects

Prof. Hitesh Borkar (PI)

Multiple Grants

1. INR 4,00,000 (ICDD Grant-in-Aid Funding): ICDD for Grant-in-Aid Funding; Duration: One Year.
2. INR 2,14,500 (UGC-DAE CSR): Designing an Artificial Synapse to Improve Synaptic Plasticity in Opto-Ferroelectric Memristor for Visual Recognition.
3. INR 34,54,000 (ANRF SERB-DST): Development of Extrinsic Negative Capacitance in Ferroelectric-Dielectric Libraries for Designing Low-Power Logic Devices.

Multiple Sponsors

Prof. Uday Kumar (PI)

1. INR 50,00,000 (M/s. Thin Film Solutions Consultants and Project Executors Pvt. Ltd.): Development of Kelvin Probe Machine for Surface Analysis; Duration: 3 Years (06/04/2023 – 05/04/2026, Ongoing).
2. INR 10,00,000 (DRDO): A Proof-of-Concept Implementation of TENG-Based Underwater Wireless Communication; Duration: 12 Months (10/04/2026 – 09/04/2027).

Prof. Aalu Boda (PI)

36 Months

1. INR 34,44,912 (ANRF IRG): Twisted graphene quantum dots: Theoretical insights into electronic structure for advanced nanophotonic devices. Status: Ongoing

Ongoing Research Projects

Prof. Vijay Kumar

Multiple Grants

1. (PI) INR 99.60 Lakhs (ANRF): Data-driven quantification of spatial-mode quantum entanglement using photon time-stamps; Duration: 03 Years (Ongoing).
2. (Co-PI) INR 87.43 Lakhs (ANRF): Development of a Robust AI-Driven Multi-modal Noncontact SHM Framework using Laser Speckle and Acoustic Diagnostics; Duration: 03 Years (Ongoing).

Prof. Surya K. Ghosh

Multiple Grants

1. (Co-PI) INR 72.00 Lakhs (DRDO): Sunlight mediated conversion of plastic waste to heteroatom doped hybrid materials; Duration: 2023–2026 (Ongoing).
2. (PI) INR 67.00 Lakhs (National Supercomputing Mission - NSM): Molecular Dynamics Study on a Polymer with Heterogeneous Flexibility to Model Chromatin Organization; Duration: 2025–2028 (Ongoing).
3. (PI) INR 6.60 Lakhs (MATRICS, SERB, DST): Statistical Mechanics of Crowded Environments Exhibiting Anomalous Super-diffusion; Duration: 2023–2026 (Ongoing).

Prof. Sourabh Roy

Ongoing

(PI) INR 30.00 Lakhs (ISRO): Cryo Temperature Measurement using Fiber Based Sensors.

Industry Collaborations

Bridging academia and industry for innovation, research and real-world impact

S.No	Organization	Remarks
1	**CHESS–DRDO**, Hyderabad	Defence Research
2	**Ananthi Technologies**, Hyd	MoU Collaboration
3	**Laser Science Service**, Mumbai	Industrial
4	**BEL India**, Bangalore/Pune	MoU & Industrial
5	**Honeywell India**, Bangalore	MoU Collaboration
6	**M/s Kataline Infra**, Nagpur	Industrial
7	**Indra Technologies**, Mumbai	Industrial
8	**Emmerson Controls**, Delhi	Industrial
9	**Red Apple Inc.**, New Delhi	Industrial
10	**Kwality Photonics**, Sec-bad	Industrial
11	**Nucleonix Systems**, Hyd	Industrial

S.No	Organization	Remarks
12	**Nanocrystal Lighting**, USA	Industrial
13	**Nanotheranostics Inc.**, NY	Industrial
14	**TechVanguard Labs**, Pune	Industrial
15	**OptiPulse Systems**, Chennai	MoU Collaboration
16	**AeroDynamics Corp**, Bangalore	Defence Research
17	**QuantumMatrix Tech**, Noida	Industrial
18	**BioPhotonics Global**, Hyd	MoU Collaboration
19	**Sigma Circuits**, Ahmedabad	Industrial
20	**Zenith Sensors**, Mumbai	Industrial
21	**Apex Photonics**, Kolkata	Industrial
22	**Vanguard Systems**, Kochi	MoU Collaboration

Key Insight: These collaborations strengthen research, enable technology transfer, foster innovation and create valuable industry-academia partnerships for a sustainable future.

Advanced Functional Materials

International Journal Publications

368

Conference Proceedings

75

Book Chapters

13

Patents Filed & Granted 2

Magazine Articles 2

Advanced Functional Materials :

Research Group Members & Core Faculty Profiles

Research Group

Research Group

The Advanced Functional Materials research group focuses on the synthesis, characterization and application of advanced functional materials for energy, photonics, sensing and biomedical technologies.



Advanced Materials Research Laboratory

Prof. Tumu Venkatappa Rao
Professor
Research area:
Green nanomaterials, biodegradable polymers, biocensors, supercapacitors

Prof. V Jayalakshmi
Associate Professor
Research area:
Liquid crystal - based microsensors, Gas sensors, Microfluidics Nanoparticles, Soft actuators

Prof. Abdul Azeem
Professor
Research area:
biomaterials, drug delivery, Luminescent materials and Devices, Supercapacitors, energy storage

Prof. Arun Kumar R
Associate Professor
Research area:
Photonic and sensor nanomaterials, Optical Materials and Sensors, Laser single crystals, Oxide glasses

Prof. P Syam Prasad
Professor
Research area:
Bioactive materials, Glass science and technology, Nano materials, Photonic applications of transparent materials

Prof. Bommareddy Poojitha
Assistant Professor
Research area:
Experimental condensed matter physics, Raman Spectroscopy

Prof. K. Thangaraju
Professor
Research area:
Hybrid UV Photodetectors, Organic Semiconductors, Optoelectronic devices, Organic Solar Cells (OPVs)

Prof. Sanjib Nayak
Assistant Professor
Research area:
Triboelectric Nanogenerators, Magnetic Materials, Ferroelectric and dielectric

Research & Development Projects

Summary of recent funded research initiatives and grants

#	TITLE OF THE PROJECT	AMOUNT (LAKHS)	FUNDING AGENCY	YEAR	STATUS
1	Hybrid Tetrapod Nanomaterials based Sustainable Optoelectronic Technologies	**₹42.74**	SPARC, MHRD, Govt of India	2023	Completed
2	Ion Implantation on solution processed Al_3Zr_2nO hybrid thin films for efficient UV photodetector applications	**₹0.50**	IUAC (UGC), New Delhi, Userproject	2022	Completed
3	Bio-Tribocorrosion Behavior of Sillicon Nitride Reinforced Magnesium Matrix Nanocomposites for Temporary Osteosynthesis Implants	**₹22.42**	CRG-DST-SERB	2024	Ongoing (Co-PI)
4	Development of electrospun Borate bioactive glasses substituted polymeric nanobio composite fibers for tissue engineering applications	**₹34.10**	CRG-DST-SERB	2024	Ongoing (Co-PI)
5	Laser Shock Peening Effect on the Biodegradability, Tribocorrosion Behavior of ZM21 Magnesium Alloy for Bone Fracture Implants	**₹22.08**	CRG-DST-SERB	2024	Ongoing (Co-PI)
6	Biomimetic metal oxides substituted borate-based bioactive glasses for applications in soft and hard tissue engineering	**₹16.28**	DST-SERB	2023	Ongoing (Co-PI)
7	Development of rare earth ion activated gallium based mesoporous multifunctional implantable bioglasses for bone repair and regeneration	**₹24.42**	DST-SERB	2023	Completed
8	Development of NovelThermoluminescent and Photoluminescent nanomaterials and Investigations on Their Response to C and Ag Ions Irradiation	**₹10.11**	Inter-University Accelerator Centre, New Delhi	2022	Completed
9	Development of nano/micro phosphors for applications in solid-state lighting and optical thermometry	**₹2.30**	Adam Mickiewicz University, Poznan, Poland	2024	Completed
10	Development of phosphor-in-glass materials for efficient white light generation	**₹30.43**	Science and Engineering Research Board	2020 – 2023	Completed

Sustainable Energy & Semiconductor Devices

Research Faculty & Key Investigators

TEAM – SESD

Research Leadership

Dedicated team of professors and principal researchers advancing semiconductor materials, device fabrication, and sustainable energy applications.



Advanced Energy & Nanomaterials Research

Prof. D Haranath
Faculty Member

Prof. R Rakesh Kumar
Faculty Member

Prof. Kusum Kumari
Faculty Member

Prof. Paul Joseph
Faculty Member

Prof. Hitesh Borkar
Faculty Member

Prof. K Uday Kumar Faculty Member

Prof. Srinivas Gandla
Faculty Member

Prof. Sanyukta Ghosh
Faculty Member

Prof. Satya Veer Singh
Faculty Member

Sustainable Energy & Semiconductor Devices

Core thematic areas and specialized material development initiatives

LMD

Luminescent Materials & Devices

Advanced phosphor synthesis and optical thermometry applications by DH

TENG

Tribo Electric Nano Generators

Energy harvesting and self-powered sensor technologies by RRK

TF-PPV

Thin Film Perovskite Photovoltaics

Next-generation solar energy conversion systems by KK

TCO

Transparent Conducting Oxides

Optoelectronic transparent electrodes and thin films by OPJ

FED

Flexible Electronic Devices

Wearable electronics and flexible sensor architectures by SVS

SSC

Symmetric Supercapacitors

High-performance energy storage and electrochemical cells by HS

MOF

Metal-Organic Frameworks

Porous functional materials for gas capture and catalysis by KUK

ESD

Electronic Security Devices

Anti-counterfeiting and optical data security systems by GS

TE

Thermoelectric Materials & Devices

Waste heat recovery and solid-state cooling systems by SG

Photonics and Optoelectronics Group Members and Research Areas

Research Group

Faculty Investigators & Core Specializations

Prof. Sourabh Roy
Optical waveguides and sensors

Prof. Abdul Azeem
Linear and Nonlinear Optical glasses

Prof. P. Syam Prasad
Polarization Optics and Liquid crystals

Prof. V. Jayalakshmi
Quantum Optics, AI Photonics, Fiber Lasers

Prof. R. Arun Kumar
Structured Light Beam and Pulse Propagation

Prof. Vijay Kumar
Non-Hermitian structured optical media

Prof. Pawan Singh
Advanced Photonics & Optical Materials

Group Activities & Achievements

Photonics Research Group

Projects

1.5 Cr (Ongoing) 3.0 Cr (Completed)

Patents

04 Filed / Granted

PhD Scholars

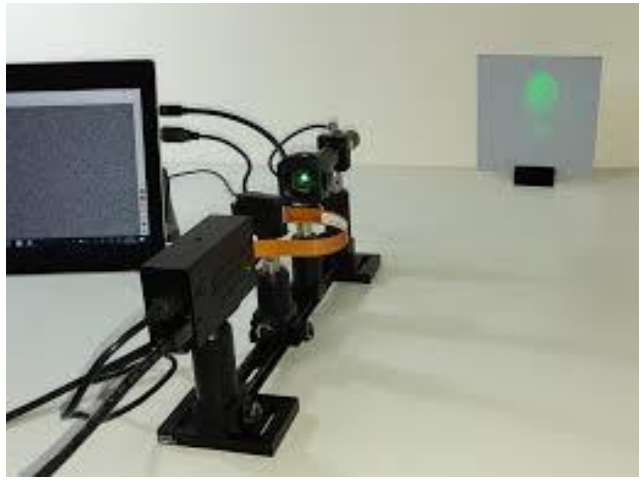
6 (Completed last 5 Yrs) 9 (Ongoing)

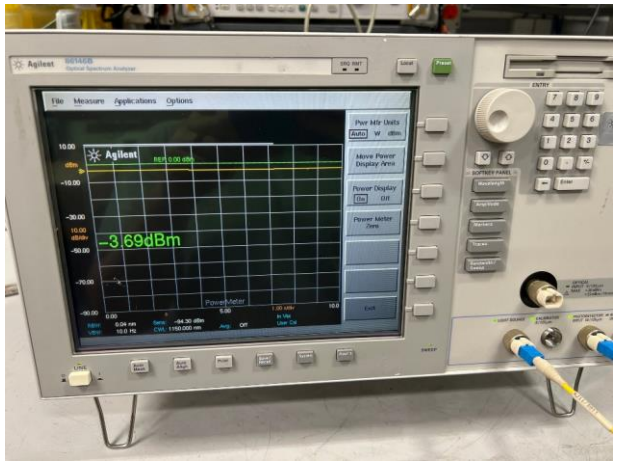
Publications

126 (International Journals) 72 (Conferences)



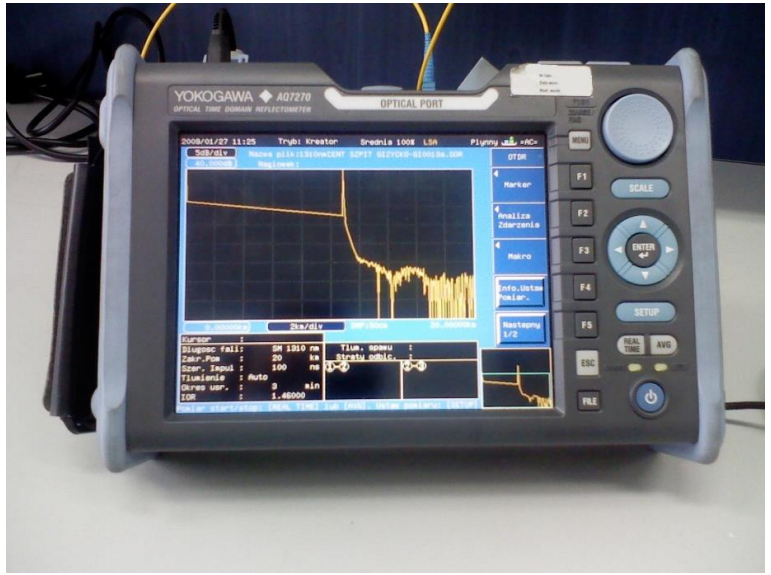
Optics and Photonics Research Equipment











Ansys
LUMERICAL

photonics,
FIBER, LASER, OPTICAL MATERIALS, AND STRUCTURED LIGHT

RESEARCH & ACADEMICS

Theoretical and Computational Physics Group

Exploring fundamental physics through theory and computation

Prof. Surya Kanta Ghosh
Associate Professor
Specialization:
Biophysics, Soft Matter, Statistical Mechanics

Prof. Aalu Boda
Associate Professor
Specialization:
Density Functional Theory, Theoretical Physics

S.No	Title of the Project	Amount (Lakhs)	Funding Agency	Year	Status
1	Twisted graphene quantum dots: Theoretical insights into electronic structure for advanced nanoplasmonic devices	34	IRG	2026	Ongoing
2	Molecular Dynamics Study on a Polymer with Heterogeneous Flexibility to Model Chromatin Organization	67	National Super computing Mission (NSM)	2025	Ongoing
3	Statistical Mechanics of Crowded Environments: Exhibiting Anomalies Superdiffusion	6.6	MATReCS	2026	Ongoing
4	Sunlight-mediated conversion of Plastic waste to Heteroatom doped Hydride material	72	DRDO	2027	Ongoing (Co-PI)

Research Facility

Processor	Cores
National Super Computing Facility (NSM): PARAM RUDRA	256
Intel Xeon Gold 6236	64
Intel Xeon Gold 6230	32
Intel Xeon W-1370	16 (x3)
Total	**400**

Publications

International Journals: **80**

Conf Proceedings : **16**

Technique

Statistical Mechanics and Computational Physics, Density Functional Theory, Largevin Dynamics, Monte Carlo, Molecular Dynamics

Systems

Low-Dimensional System: Quantum Dots, Quantum Wells and Wires, Soft Matter, Active Matter, Smart Material, Polymer, Tetrapod, etc

Patent (Filed)

Controlled Polymer Translocation Through a Pore Using Tunable Molecular Crowding, 2026

Packages

LAMMPS, GROMACS, VASP, Mathematica, MATLAB, Ovito, VMD, etc

Relevant Courses

Quantum Mechanics, Statistical Physics, Mathematical Physics, Computer Programming for Physics, Advanced Simulation Technique, Heat and Thermodynamics, Field Theory, Physics of Biological Systems, etc

Awards, Recognitions & Honours

Faculty Excellence

Prof. D. Haranath

Inducted as Fellow of the Telangana Academy of Sciences (TAS); Recognized among Top 2% World Scientists.

Prof. Kusum Kumari

INSA Visiting Scientist Award (2023); Bhaskara Advanced Solar Energy Fellowship Award by Indo-US S&T Foundation.









राष्ट्रीय प्रौद्योगिकी संस्थान वरंगल
NATIONAL INSTITUTE OF TECHNOLOGY WARANGAL

Research Excellence Award - 2025

Prof. Rakesh Kumar Rajaboina, Department of Physics is conferred with Research Excellence Award in Physical Sciences for the year 2025, in recognition of his outstanding research contributions.

5th September, 2025

Prof. Bidyadhar Subudhi
Director





With the Outgoing M.Sc. Tech Batch

Class of 2023 – 2026



Photonics



Electronics

Insightful Discussions

Collaborative Exchange

Interactive Brainstorming

Engaging research group sessions fostering innovative ideas, strategic alignment, and peer-to-peer mentorship.

Strategic Collaboration

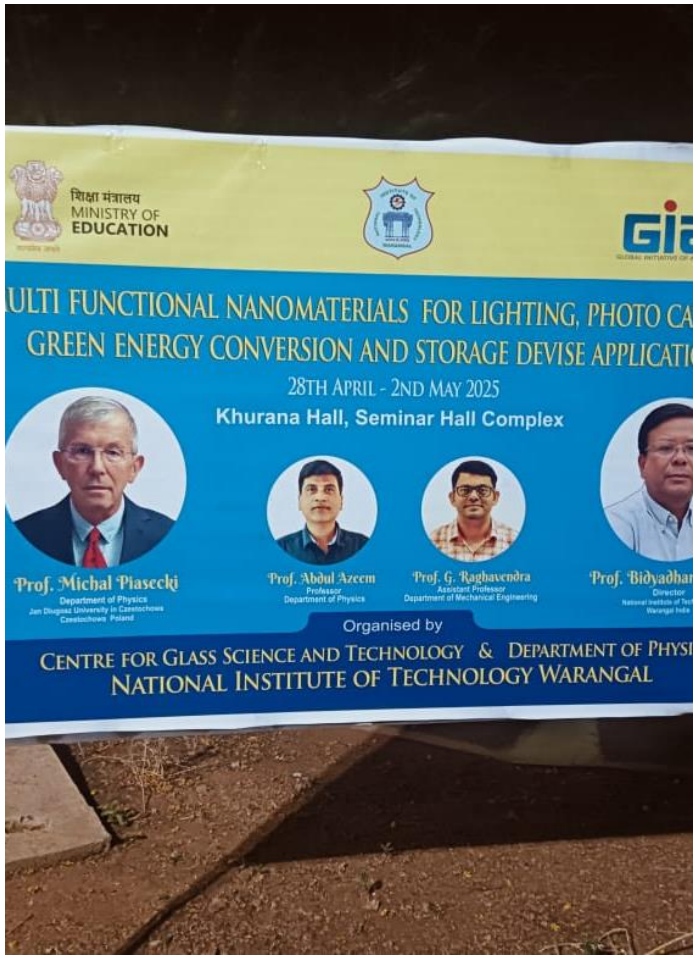
Deep-dive conversations on advanced photonics applications, future projects, and interdisciplinary milestones.



Director's Appreciation



International Program





Industry connect

Academic Exchange

Collaborative Analysis

Fostering peer review and technical ideation among doctoral scholars and faculty researchers.

Advanced Instrumentation

Evaluating experimental setups and spectroscopic outcomes for state-of-the-art optical devices.

Expert lectures and Conclave events



Team Spirit and Conducive Environment









In-a nutshell

Overview & Highlights

Student Opportunities

- Research internships.
- Industry training.
- Higher studies and academic careers.
- Careers in R&D, technology, analytics, and education.

Achievements & Highlights

- Strong academic reputation.
- Successful alumni network.
- Significant research contributions.
- Consistent growth in publications and projects.

Future Directions

→ Emerging research in advanced materials and quantum technologies.

→ Greater industry engagement and collaborative partnerships.

→ Expansion of interdisciplinary programs.

Report Administration & Contact Information

REPORT SUBMITTED TO

The Director
NIT Warangal

REPORT CHAIR

Prof. Sourabh Roy
Professor and Head, PH, NITW

CONTRIBUTORS

Team of Faculty members, PH, NITW

COMPILED BY

Prof. R. Arun Kumar
Faculty-in-Charge, Information, PH, NITW

Department Contact

HEAD OF THE DEPARTMENT

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