KL (DEEMED TO BE UNIVERSITY)

KL ACCREDITED BY NAAC WITH A++ GRADE

CATEGORY 1 UNIVERSITY BY MHRD, Govt. of India

nirf 2024 NATIONAL INSTITUTIONAL RANKING FRAMEWORK RANKED 22 AMONG ALL UNIVERSITIES

44 YEARS OF EDUCATIONAL LEADERSHIP

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CENTRE OF EXCELLENCE FOR NANOTECHNOLOGY (COE-NANO)

CENTRE OF EXCELLENCE FOR NANOTECHNOLOGY (COE-NANO)

Aim and Objectives: To drive innovation and excellence in nanotechnology research within the field of Electronics and Communication Engineering, focusing on the development of advanced materials, devices, and systems for healthcare, energy, and environmental applications. The centre aims to bridge the gap between fundamental research and practical solutions, empowering both academia and industry with cutting-edge technologies.

Objectives:

1. Advanced Research in Nanotechnology
2. Development of Next-Generation Devices
3. Interdisciplinary Collaboration and Networking
4. Innovation, Patents, and Commercialization
5. Capacity Building and Knowledge Transfer

Research Focus Areas

1. Nanophotonics and Plasmonics
2. Biosensors and Bioelectronics
3. Nanomaterials and Nanocomposites
4. Nanoelectronics and Nanoscale Devices
5. Energy Harvesting and Storage
6. Environmental Nanotechnology
7. Nanobiotechnology
8. Flexible and Wearable Electronics
9. Integrated Photonics and Optical Computing
10. Smart Materials and Sensors

RESEARCH GROUP MEMBERS

Name of the Member	Designation	Emp ID
Dr. Suman Maloji	Professor	841
Dr. Santosh Kumar	Professor	8622
Dr. Ragini Singh	Associate Professor	8620
Dr. Chella Santhosh	Associate Professor	5439
Dr. S.R. Srither	Associate Professor	8276
Dr. Balaji Ramachandran	Assistant Professor	8033
Dr. V. Yesudasu	Assistant Professor	7233
Dr. Sourabh Jain	Assistant Professor	9207

FACILITIES AND RESOURCES

Equipment	1. Fusion Splicer (Fujikura 88s) 2. Tungsten Halogen Source 3. Spectrometer 4. Multimode Reader 5. Probe Sonicator 6. Ultra-Sonic Cleaner (Water-Bath) 7. Weighing Machine (µg Range) 8. Vacuum Oven (Up to 200°C) 9. Magnetic Stirrer (Up to 120°C) 10. Centrifugal Machine (Up to 10,000 RPM) 11. Rectangular Fume Chamber (Fume Hood) 12. Refrigerator (2–8°C and -20°C).
Tools	**MATLAB, Microsoft**

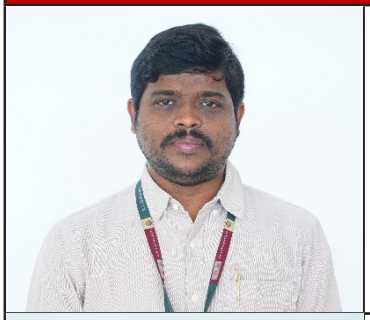
COLLABORATIONS

COUNTRY NAME	INSTITUTE/ORGANIZATION NAME
USA	University of Texas, Austin, USA
United Kingdom	Northumbria University at Newcastle, London
Italy	University of Campania Luigi Vanvitelli, Itali
China	Liaocheng University
Czechia	VSB - Technical University of Ostrava, Czechia
Belgium	University of Mons, Belgium
China	GuangDong University of Technology Baisha, China
China	University of Science and Technology Beijing, China
India	IIT Bhubaneswar, India
India	IIT (ISM) Dhanbad, India
India	IIT Patna
China	Beijing Normal University, Zhuhai
Iraq	Salahaddin University-Erbil, Iraq
Brazil	Federal University of Espírito Santo (UFES), Brazil
India	NIT Rourkela
India	NIT Jamshedpur
India	MNIT Jaipur
Portugal	University of Aveiro, Portugal
India	IIIT Guwahati
India	MNIT Allahabad
Kazakhstan	Nazarbayev University, Kazakhstan
Republic of Korea	Gachon University

FACULTY MEMBERS

NAME & DESIGNATION		RESEARCH AREA
	Dr. Suman Maloji, Professor, ECE Dept.	Mentor – CoE-NANO
	Dr. Santosh Kumar, SPIE FELLOW, IETE FELLOW Professor, ECE Dept. Lab Head –CoE-NANO Group Head – Nanotechnology Research Group (NTRG) Faculty Advisor – KLEF SPIE/OPTICA Student Chapters	Optical Fiber Sensors, WaveFlex Biosensors, Waveguide & Interferometers, Optical Networks and Systems, Nano & Bio-Photonics, Nanotechnology & Nanoscience, Nanomaterials, Integrated Photonics, Nonlinear Optics, Distributed Optical Sensing, Structural Health Monitoring, Silicon Photonics, Microwave Photonics, Biophysics, Bioelectronics, Biological Nanodevices, Biomedical Devices and Instrumentation, Bionanophotonics & Biosensors, Surface Plasmon Resonance (SPR), Localized Surface Plasmon Resonance (LSPR), Photonic Crystal Fibers, and the Internet of Things.
	Dr. Ragini Singh Associate Professor, BT Dept.	Nanobiotechnology, Biosensing, Cancer biology, Microbiology, Molecular biology, Environmental biology, Immunology.

FACULTY MEMBERS

NAME & DESIGNATION		RESEARCH AREA
	Dr. Chella Santhosh Associate Professor, ECE Dept.	Carbon nanotubes & Graphene Based materials, CVD Techniques for the growth of Carbon Nanotubes, Synthesis of carbon-based materials and magnetic nanocomposites, Nanomaterials as sorbents for heavy metal ions removal towards environmental remediation, Mesoporous, Nanoporous and Magnetic materials and Hybrid Materials for Photocatalysis, Supercapacitors, Batteries and Electrochemical applications
	Dr. S.R. Srither Associate Professor, ECE Dept.	Triboelectric nanogenerator, Piezoelectric nanogenerator, Hybrid self-powered energy harvester, Pressure sensing device, Health care monitoring, Self-powered IoT, Self-powered Sensors, Modified electrodes, Electrochemical supercapacitors, Electrochemical sensors, Batteries, nanocomposites, MoF-based materials.
	Dr. Balaji Ramachandran Assistant Professor, ECE Dept.	Surface Enhanced Raman Scattering (SERS), Electrochemical sensors, Bio-inspired surfaces, photocatalysis, Upconversion nanomaterials, Modified electrodes, Material science, Biosensors, health care devices, fog harvesting, Plasmonic nanomaterials, Wettability optimization, Raman Spectroscopy, Pesticides and drug analysis.
	Dr. Yesudasu Vasimalla Assistant Professor, ECE Dept.	Optical Biosensors, Surface Plasmon Resonance Based Sensor, Photonic Crystal Fiber Sensor.
	Dr. Sourabh Jain Assistant Professor, ECE Dept.	Integrated Photonics, Optical Biosensing, Optical Computing, Optical Neural Network, Silicon Photonics, Plasmonics, lab-on-chip diagnostics, Metamaterial, III-V materials, Surface Enhanced Raman Spectroscopy (SERS).

About Lab – Head

Dr. Santosh Kumar, Professor, Koneru Lakshmaiah Education Foundation, India

Dr. Santosh Kumar (Fellow of SPIE and IETE) received the Ph.D. degree from IIT (ISM) Dhanbad, Dhanbad, India, in 2014. He was with Liaocheng University, Liaocheng, China, from 2018 to 2023. He is currently a Professor with the Department of Electronics and Communication Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, India. He also serves as the lab head of centre of excellence for nanotechnology (CoE-NANO), group head of the nanotechnology research group (NTRG), and Advisor - R&D of KLEF. He has been recognized as one of the world's top 2% scientists by Stanford University for the last three consecutive years. With extensive research experience, he has supervised 20 M.Tech. dissertations and seven Ph.D. candidates. His contributions to the field include the publication of over 5000 research articles in prestigious SCI journals and conferences, with more than 10,000 citations and an h-index of 60. His work has been featured in renowned journals, such as Biosensors and Bioelectronics, Journal of Lightwave Technology, Optics Express, Optics Letters, Applied Physics Letters, ACS Applied Nano Materials, and Biosensors, and various IEEE Transactions. He has presented his research at conferences in India, China, Belgium, and USA, demonstrating his global reach. He is the author of four scholarly books published by CRC Press (Taylor & Francis) and Springer Nature. He recently granted a patent application for his ground-breaking optical fiber sensing technology. As a highly regarded expert, he has reviewed over 2500 manuscripts for esteemed SCI journals published by IEEE, Elsevier, Springer, OPTICA, SPIE, and Nature. With expertise in electronics, communications engineering, and physics, his research focuses on WaveFlex biosensors, fiber optic sensors, photonics and plasmonic devices, nano and biophotonics, waveguides, interferometers, and the Internet of Things. Through fruitful collaborations with renowned universities in India, China, Portugal, Iraq, Kazakhstan, Brazil, and Italy, he conducts cutting-edge scientific research. Dr. Kumar is a fellow of SPIE, fellow of IETE, a Life Fellow Member of the Optical Society of India (OSI), and a Senior Member of IEEE, OPTICA, and SPIE. He also serves as an OPTICA Travelling Lecturer. Recognising his contributions, he has been appointed Chair of the Optica Optical Biosensor Technical Group and Associate Editor for Scientific Reports, IEEE Internet of Things Journal and Biomedical Optics Express.

OUR COLLABORATORS


Bingyuan Zhang, Liaocheng University, China


Dr. Carlos Marques, University of Aveiro, Portugal


Dr. Earu Banoth, NIT Rourkela, India


Dr. Mourina Ghosh, IIIT Guwahati, India


Dr. Qiang Wu, Northumbria University at Newcastle, London


Dr. Rajan Jha, IIT Bhubaneswar, India


Dr. Saurabh Kumar Pandey, IIT Patna, India


Prof. Christophe Caucheteur, University of Mons, Belgium


Prof. Jan Nedoma, VSB - Technical University of Ostrava, Czechia


Prof. Ray Chen, University of Texas, Austin, USA


Dr. Ajay Kumar, NIT Jamshedpur, India


Dr. Daniele Tosi, Nazarbayev University, Kazakhstan


Dr. Ghanshyam Singh, MNIT Jaipur, India


Dr. Nunzio Cennamo, University of Campania Luigi Vanvitelli, Itali


Dr. Qinglin Wang, Liaocheng University, China


Dr. S .K. Raghuwanshi, IIT-ISM Dhanbad, India


Dr. Sushank Chaudhary, GuangDong University of Technology Baisha, China


Prof. Dr. Arnaldo Leal-Junior, Federal University of Espírito Santo (UFES), Brazil


Prof. Nasih Hma Salah, Salahaddin University-Erbil, Iraq


Prof. Rui Min, Beijing Normal University, Zhuhai, China


Prof. Xian Zhou, University of Science and Technology Beijing, China

RESEARCH SCHOLARS

NAME & DESIGNATION		RESEARCH AREA
	Ms. V. Jyothsna Research Scholar, ECE Dept.	Optical Fiber Sensors, Plasmonic Sensors
	Mr. K. Babu Research Scholar, ECE Dept.	Nanotechnology, Nanoscience
	Ms. G. Vasanthi Research Scholar, ECE Dept.	Photonics based Sensors, Optical biosensor
	Mr. N. Jagadeesh Research Scholar, ECE Dept.	Plasmonic Sensors

EQUIPMENT DETAILS

S.No	Equipment/Instrument	Make & Model
1	Fiber Fusion Splicer	Fujikura & 88S
2	Tungsten Halogen Light Source	Avantes & AvaLight-Hal-S-MINI2
3	Spectrometer	Thermofisher Scientific & S-924
4	Microplate Reader	LTECK & W96
5	Probe Sonicator	Mangaldeep Tech Solutions & EI-1000UP
6	Ultra-Sonic Cleaner (Water-bath)	Sisco & J13150, 6L
7	Weighing Machine (in µg range)	Scale Tec & SAB-203E
8	Refrigerator (2-8 degree)	Haier & HRD - 2105/2024
9	Refrigerator (-20 degree)	Haier & HFC - 320D/2024
10	Vacuum Oven (upto 200 degree C)	
11	Magnetic stirrer (upto 120 degree C)	REMI & 2MLH
12	Centrifugal machine (upto 10000 RPM)	Sri Siva Sceintific & SSBLCF
13	Fume Hood	SISCO

TOP-CITED HIGH-IMPACT PUBLICATIONS

1. R. Balaji et al., "A comprehensive review on graphene-based materials: From synthesis to contemporary sensor applications," Materials Science and Engineering: R: Reports, Vol. 159, 100805, June 2024 **(Impact Factor of 31.6) [Q1 Journal]**
2. Rajan Jha, Pratik Mishra, Santosh Kumar, "Advancements in optical fiber-based wearable sensors for smart health monitoring," Biosensors and Bioelectronics, Vol. 254, p. 116232 (23 March 2024) **(Impact Factor: 10.7) [Q1 Journal]**
3. Ragini Singh, W. Zhang, X. Liu, B. Zhang, Santosh Kumar*, "WaveFlex Biosensor: MXene-Immobilized W-shaped Fiber-Based LSPR sensor for highly selective tyramine detection," Optics & Laser Technology, Vol. 171, 110357 (2024) **(Impact Factor: 5) [Q1 Journal]**
4. H. C. Gomes, X. Liu, A. Fernandes, C. Moreirinha, Ragini Singh, Santosh Kumar, F. Costa, N. Santos, C. Marques, "Laser-Induced graphene-based Fabry-Pérot cavity label-free immunosensors for the quantification of cortisol," Sensors and Actuators Reports, Vol. 7, 100186 (20 Jan. 2024) **(Impact Factor: 5.9) [Q1 Journal]**
5. B. Zhang, Z. Wang, L. Ma, J. Chen, H. Wang, X. Li, Santosh Kumar, R., Min, "Intelligent Wearable Photonic Sensing System for Remote Healthcare Monitoring Using Stretchable Elastomer Optical Fiber," IEEE Internet of Things Journal, Vol. 11, Issue: 10, pp. 17317 - 17329 (22 January 2024). **(Impact Factor: 10.6) [Q1 Journal]**
6. C. Gu, Ragini Singh, G. Li, Q. Wang, F.-Z. Liu, Rui Min, Daniele Tosi, Bingyuan Zhang, Santosh Kumar*, "Development of W-Type Four-Core Fiber-based WaveFlex Sensor for Enhanced Detection of Shigella Sonnei Bacteria Using Engineered Nanomaterials," IEEE/OSA Journal of Lightwave Technology, Vol. 42, Issue 14, pp. 5055 - 5067 (19 March 2024) **(Impact Factor: 4.7) [Q1 Journal]**
7. F. Liu, Ragini Singh, Q. Zeng, G. Li, R. Min, B. Zhang, and Santosh Kumar*, "Gold Nanoparticle-Coated Magnetic Graphene Oxide as a Dual-Mode Immunochromatographic Biosensor for Enrofloxacin Residue Analysis in Food Samples," ACS Appl. Nano Mater. (April 23, 2024) **(Impact Factor: 5.9) [Q1 Journal]**
8. Ragini Singh, P. Choudhary, Santosh Kumar*, H. K. Daima, "Mechanistic approaches for crosstalk between nanomaterials and plants: plant immunomodulation, defense, stress resilience, toxicity, and perspectives," Environmental Science: Nano (10 April 2024) **(Impact factor: 7.3) [Q1 Journal]**
9. Y. Vasimalla, S. Singh, G. R. Reddy, R. Kumar, Suman Maloji, Santosh Kumar*, "Titanium Dioxide-Graphene-Black Phosphorus-Based SPR Sensor for Helicobacter Pylori Bacteria Detection," IEEE Sensors Journal, Vol. 24, Issue15, pp. 23738 - 23745 (10 June 2024) **(Impact Factor: 4.3) [Q1 Journal]**
10. Yesudasu Vasimalla, Baljinder Kaur, Suman Maloji, Santosh Kumar*, "Design and Probing of Prism-Based SPR Nano-Biosensor for Human Sperm Detection," IEEE Transactions on NanoBioscience, Vol. 24, Issue 1, pp. 70 - 77 (26 June 2024) DOI: 10.1109/TNB.2024.3419571 **(Impact Factor: 3.7) [Q2 Journal]**
11. N. H. Salah, B. Kaur, H. M. Rasul, Yesudasu V., Santosh Kumar*, "Optical Fiber-Based SPR Sensor for Chemical and Biological Samples Detection Using 2D Materials," IEEE Sensors Journal, Vol. 24, Issue 16, pp. 25644 - 25651 (15 July 2024) **(Impact Factor: 4.3) [Q1 Journal]**
12. G. Zhu, F. Liu, W. Kong, X. Yang, Santosh Kumar*, X. Zhou, "Low-Frequency Vibration Detection Enhancement in Dual-Pulse DAS with Single AOM," IEEE Transactions on Instrumentation and Measurement, Vol. 73, p. 9514708 (1 Sept. 2024) DOI: 10.1109/TIM.2024.3449973 **(Impact Factor: 5.6) [Q1 Journal]**
13. Guiwei Zhang, Ragini Singh, Bingyuan Zhang, Fengzhen Liu, Santosh Kumar*, Guoru Li, "ZnO-NWs and WS_2-QDs-Functionalized Multicore Fiber-based W-shaped WaveFlex Biosensor for Rapid Detection of Hemoglobin A1c in Serum Samples," IEEE Transactions on Instrumentation and Measurement, Vol. 73, p. 7007910 (1 Oct. 2024) **(Impact Factor: 5.6) [Q1 Journal]**
14. Yesudasu Vasimalla, N. H. Salah, Chella Santhosh, Ramachandran Balaji, Hogr M. Rasul, S.R. Srither, Santosh Kumar*, "SMF-based SPR sensors utilizing thallium bromide immobilization for detection of various bacterial cells," Microchemical Journal, Vol. 208, pp. 112312 (9 Dec. 2024) **(Impact Factor 4.9) [Q1 Journal]**
15. Yesudasu Vasimalla, Baljinder Kaur, Santosh Kumar*, "Metallic Layer-Based SPR Biosensor for Mycobacterium Tuberculosis Detection Employing Zinc Oxide and TMDCs Heterostructure," IEEE Transactions on Plasma Science, pp. 1-8 (16 Dec. 2024) [Q2 Journal]

BOOK PUBLISHED

1. Santosh Kumar*, A. Mishra, R. A. Pagare, C. Marques, "Future Optical Access Network Design and Modelling of FTTX/5G/IoT/Smart City Applications and Services," Springer Nature, Singapore, 13 Aug. 2024 (Book) ISBN: 978-981-97-4370-4.
2. Baljinder Kaur, Santosh Kumar*, Brajesh Kumar Kaushik, "Biosensors: Nanomaterials, Approaches, and Performance-Enhancement Strategies," Wiley-IEEE Press, USA (17 Dec. 2024) ISBN: 978-1-394-26820-7

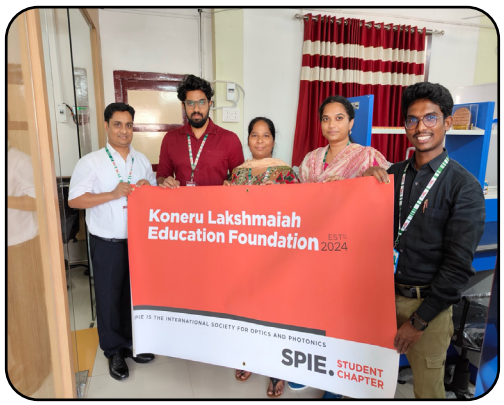
AWARDS AND RECOGNITION

1. Received recognition as an Excellent Foreign Expert from the Department of Education of Shandong Province, China.
2. Achieved the Best Paper Award from IEEE Journal of Lightwave Technology (JLT, USA, Single award worldwide).
3. Dr. Santosh Kumar has delivered an invited talk on "Advances in Optical Fiber Biosensors for Healthcare Applications" at the School of Optoelectronics Engineering, Guilin University of Electronic Technology, Guilin, China.
4. Dr. Santosh Kumar presented his work as an Invited Speaker at Photonics 2024, hosted by IIT Kharagpur, one of India's premier photonics conferences, during 12-15th Dec. 2024.
5. Participated as an Invited Speaker at an International Conference held at Manipal University, Jaipur from March 27th to 28th, 2024.
6. Dr. Santosh Kumar delivered a well-received keynote address titled "Wave Flex Biosensors for Healthcare Applications" at the recent 2nd International Conference on VLSI and Microwave and Wireless Technologies (ICVMWT 2024).
7. Dr. Santosh Kumar's term as Associate Editor of Biomedical Optics Express (SCI, Q2 Journal) has been renewed. His second term will commence on August 1, 2024, and extend until July 31, 2027.
8. Dr. Santosh Kumar elected as the Chair of the Optical Biosensors Technical Group at Optica (formerly the Optical Society of America), beginning his new term in January 2025. This prestigious role underscores his dedication to advancing the field and fostering a vibrant, impactful community for students and researchers alike.
9. Delivered an invited talk at the ETOT-1 International Conference hosted by SRM University, Amaravathi. The presentation highlighted the significance of emerging WaveFlex Biosensors and their transformative potential.
10. Dr. Santosh Kumar become a Fellow member of The Institution of Electronics and Telecommunication Engineers (IETE). This prestigious recognition is awarded to individuals who have achieved eminence through their outstanding work in the fields of electronics and telecommunication engineering.

STUDENT CHAPTERS ESTABLISHMENT

We are delighted to announce the successful establishment of the Optica Student Chapter (affiliated with the International Optical Society) and the SPIE Student Chapter at KLEF. These chapters mark a significant milestone in fostering international collaboration and academic engagement.

Both chapters are now proudly associated with CoE-NANO, enhancing our commitment to advancing research, innovation, and education in nanotechnology and optics. They provide students with a platform to lead, network with global experts, participate in cutting-edge workshops, and gain access to valuable resources. This development not only promotes student leadership but also positions KLEF as a hub for cultivating the next generation of scientists and engineers in optics and nanotechnology.



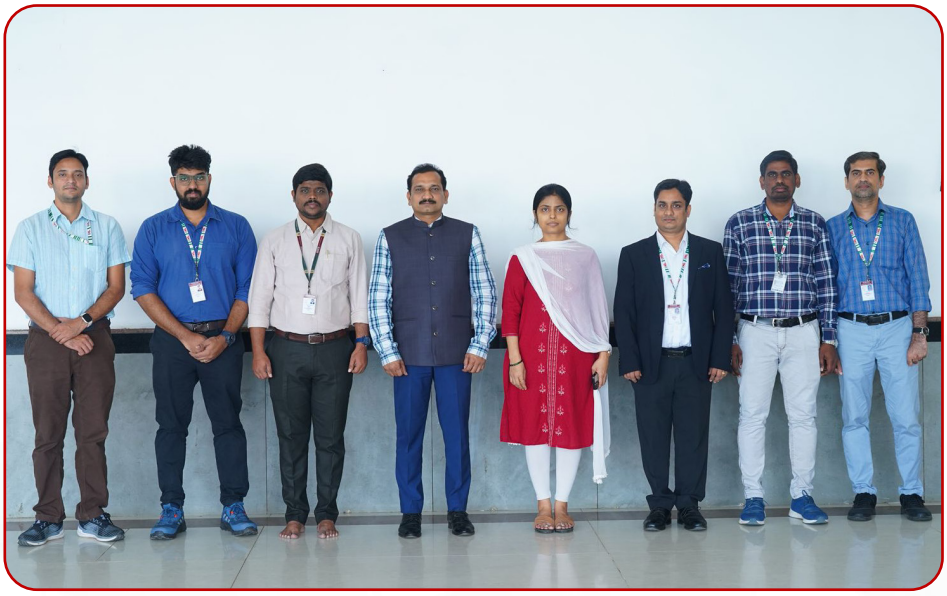
TOP 2% OF SCIENTISTS

Three esteemed members of the Nanotechnology department—Dr. Santosh Kumar, Dr. Chella Santhosh, and Dr. Ragini Singh—have been recognized among the top 2% of scientists globally. Notably, two of them (Dr. Santosh Kumar and Dr. Ragini Singh) are also ranked in the top 2% for career-long achievements. They were honored by the University with an award during the SAMYAK-2024 event.

HIGHLIGHTS OF COE-NANO ACHIEVEMENTS IN YR. 2024

Published 125 high-quality research papers, including 55 in IEEE journals.

- Established the Centre of Excellence for Nanotechnology (CoE-NANO), forming a dedicated team of eight highly focused researchers.
- Published 12 patents.
- Delivered 10+ Keynote/Invited Talks.
- Published 2 books under Springer Nature and Wiley-IEEE publishers.
- Completed 500+ journal reviews and contributed as editors for 100+ journals.
- Submitted over 10 project proposals to external funding agencies.
- Started two international student chapters (SPIE/OPTICA, USA) to foster global collaboration.
- Formed the Nanotechnology Research Group (NTRG) to advance research in cutting-edge areas.
- Introduced Nanotechnology and Optoelectronics (NTO) courses for our undergraduate students.



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