



THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

**TIET – VT CENTER OF EXCELLENCE IN
EMERGING MATERIALS (CEEMS)**

NEWSLETTER

(Vol.II February 2022)

 **VirginiaTech**
Invent the Future®

CEEMS 

A platform for the new materials age

Message From

Chair Professor, CEEMS



Dr. ROOP L. MAHAJAN

Department of Mechanical Engineering
Virginia Tech, Blacksburg, USA

CEEMS MOVES TO A NEW HOME

I am delighted to share with you a landmark event in the short history of TIET-VT Center of Excellence in Emerging Materials (CEEMS). We have a new home—a newly constructed 7,520 square feet floor on the top of an existing building (SAI) in Avantha Centre for Industrial Research & Development (ACIRD). The floor, which was formally inaugurated on October 21, 2021, houses three state-of-the-art laboratories: Laboratory for Bio-x, Laboratory for Coal-derived



Graphene-x, and Laboratory for Composites & Exploratory Research. These are aligned with our research thrust areas and are equipped with some of the key instruments essential to achieving the goals of the research projects undertaken under the thrust areas. In recognition of the critical role played by scientific computation as the third leg of learning and research, the floor also houses a computational and simulation (C&S) laboratory as one of our core capabilities, impacting all the thrust areas.

When thinking of emerging or frontier materials, I am reminded of a quote from Kafatos and Eisener, Science (2004), v. 303, p.1257, "The new frontier is the interface, wherever it remains unexplored". Having experienced, first-hand, the

power of multiple perspectives in solving complex problems, we would ensure that in the new laboratories, doctoral students would share space, not by discipline but by their research



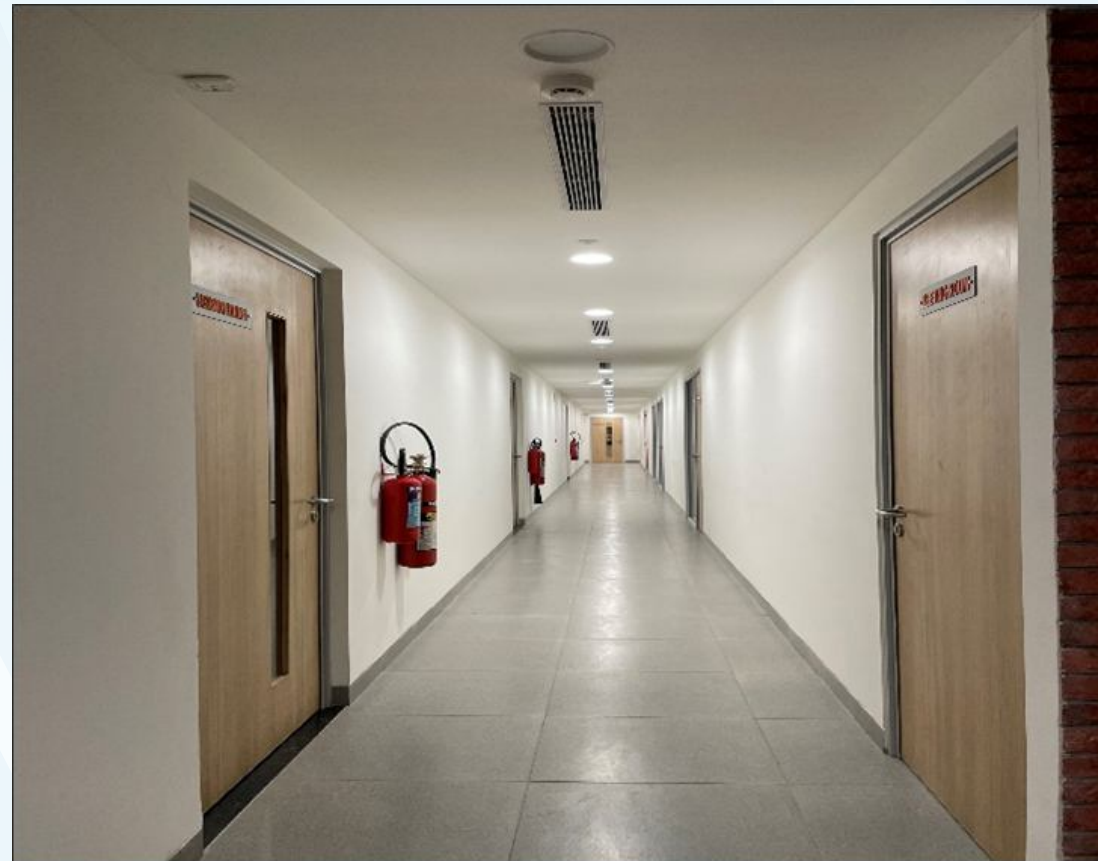
projects. In these shared spaces, engineers, chemists, physicists working together will conduct cutting-edge research and explore the unknown.

A distinguishing feature of the CEEMS home is a seminar room, which would not only serve as a common space to enhance communication within the university community and beyond, but also as an incubator of innovation—non-linear and transformative. To this end,

we will initiate a Black Swan Seminar series where unencumbered dialogue and exploration of the unknown would be the expectation.

In his New York Times best seller, "The Black Swan", author Nassim Nicholas Taleb defines a Black Swan as an event that has three characteristics; it is an outlier; it carries an extreme impact; it has retrospective predictability. He further makes a claim that our world is

dominated by Black Swans. He cites the example of the three recently implemented technologies that most impact our world today - the Internet, the computer, and the laser—and notes that all three were unplanned, unpredicted, and unappreciated upon their discovery, and remained unappreciated well after initial use. While it may not be possible to predict the next Black Swan, it is my contention that we can create an environment and a breeding ground for future Black Swans--an environment in which engineers, scientists, and humanists from different disciplines can come together to move beyond predictable, incremental advances in current technologies to the disruptive technologies of the future.



Message From

Deputy Director



Dr. AJAY BATISH

Department of Mechanical Engineering
TIET

Research at TIET is at the apex of the institute's long-term strategic plan, which is to be a leading research focused and teaching intensive institute in India. Research is a central theme of the institution's mission as reflected in the recently published 2025 strategic plan. TIET has experienced remarkable growth in research activity during the last few years, and growth is often the by-product of doing things better. Going forward the institution is making targeted investments to develop new interdisciplinary and inter-institutional collaborations to establish six centres of excellence (COE) across identified research themes. The Emerging Materials centre, created in 2019, is undertaking multiple initiatives to build research excellence focused at solving real world problems and providing scholars with an infrastructure for better application and analytical skills. Research at the centre has facilitated academic collaborations, industrial interactions and knowledge transfer; and is providing support to academics on research funding streams, preparing bid proposals and negotiating research contracts. TIET is allocating a substantial budget on funding the research activities of the centres. This creates numerous opportunities for graduate and undergraduate students and provides faculty an enriching environment. In the near future, we foresee a significant growth in research activities across disciplines for interdisciplinary and multi-disciplinary research. Individual academicians have developed their own plans indicating the potential areas of research, infrastructure requirement and possibilities of collaboration with leading academics at global/ national universities/ organizations under the broad umbrella of the Centre. The TIET-VT Center of Excellence in

Emerging Materials (CEEMS) has now moved into its own building on the top floor of the SAI lab. This building is already serving as a home to the CEEMS laboratories in support of its thrust areas, a suite of sophisticated equipment for synthesizing and testing novel nanostructured materials and systems, and CEEMS-supported doctoral and post-doctoral fellows. It is also providing access to researchers from across the campus and industry for conductive transformative research. The Centre is providing innovative solutions for the critical issue of advanced materials development of India and the world at large. The overarching mission of the centre is to link the two collaborating institutions (TIET & VT) to provide a viable interface between industry and academia. The strength of the centre meshes the established expertise of Prof Roop Mahajan's group and business practices with the growing expertise and abilities at TIET. These together will equip a new generation of researchers with the knowledge to develop and implement a range of innovative solutions for outstanding research coming out of this Center. The centre will set its sights on becoming a recognized hub for emerging materials in India and abroad for enhancing human life in a sustainable manner.

IN THEIR OWN WORDS...



Dr. SHAGUN KAINTH
(Post-Doctoral Fellow)

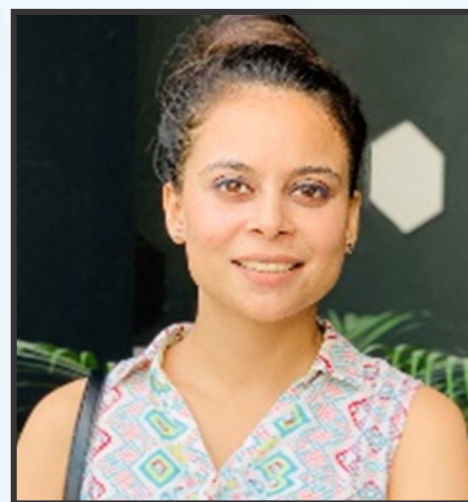
"CEEMs facilitates various instruments such as freeze dryer, hot air oven, FTIR and spin coater to fabricate fluorescent powder and films. Presently, I have synthesized yellow emissive **Ludox@CDs** for the fingerprint evaluation on non-porous surfaces. Moreover, research is also going on to obtain thin films using PVA and carbon-dots for sensing applications."

Research area: Preparation of fluorescent powder, thin films, hydrogels, and paper strip to use them for analytical applications for sustainable environment.

"CEEMS has provided us with as much facilities as possible to carry forward our research smoothly. Facilities such as FTIR, Biosafety level-2 Laminar air flow, CO2 incubator, Freeze dryer, Hot air oven, Autoclave, Fume-hood related to my work are available here in the lab. I am very much grateful for getting such a great support and facilities which are indispensable for me to achieve my research goals."

Research area: Treatment of Gastric

Cancer by Activation of Natural Immunity using Helicobacter pylori coated with Iron-oxide Nano-particles: in silico, in vitro, and in vivo approaches.



Ms. KOMAL ATTRI
(Junior Research Fellow)



Ms. ANUSHKA GARG
(Junior Research Fellow)

“TIET, Patiala along with Virginia Tech, USA has set up a Center of Excellence in Emerging Materials (CEEMS) which has provided numerous researchers and scholars with the much needed facilities and research infrastructure to carry out their research endeavour. I am very grateful to the CEEMS for affording excellent facilities such as Ball mill, Tubular furnace, FTIR, Fume-hood, Spin coater, Hot-air oven, Centrifuge, Sonicator, Freeze-dryer, Refrigerator, Distillation unit etc.

which are an essential requirement for my research work. I am sure that the facilities as well as the faculty at CEEMS is set to achieve new research heights in future.”

Research area: Synthesis of graphene oxide and multilayer graphene from different ranked coals using an environment friendly approach and scale-up of the process



AAYUSHI KUNDU
(Junior Research Fellow)

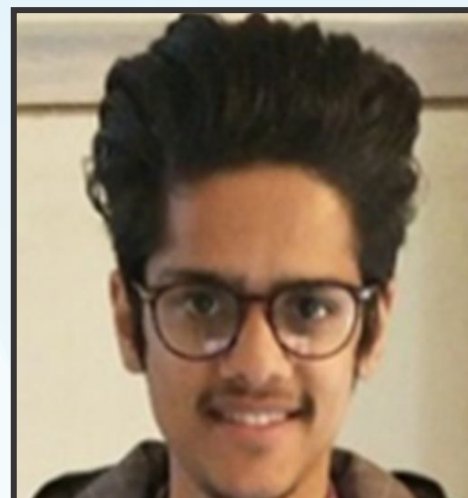
“Presently I am using various facilities like FT-IR, Centrifuge, sonicator, and hot air oven available at CEEMS. I am highly thankful to CEEMS for providing such state of the art facilities and research environment.”

Research area: Synthesis of GQDs and CQDs from different precursors for fluorometric detection of biomolecules/ metal ions: A detail comparison study

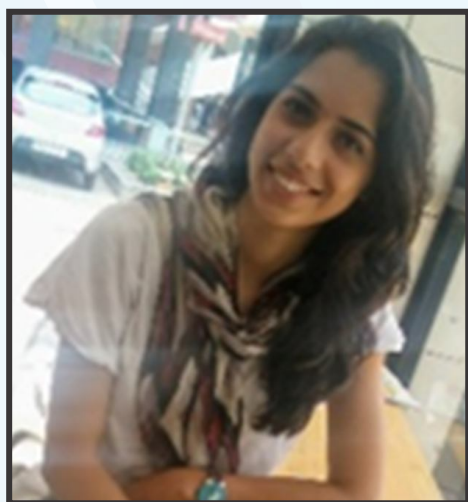
“TIET-VT research collaboration venture is providing enormous research opportunities and facilities to young researchers like me. The biggest advantage of working in such multi-disciplinary research environment is that I get opportunity to interact with fellow researchers from varied background, share and discuss research experiences. Such interactions not only enrich our knowledge base but also leads us to exciting and innovative solutions. Apart from the

state of the art research infrastructure, CEEMS also affords the research direction from renowned faculty and mentors and I feel blessed to be associate with CEEMS.”

Research area: Epoxy coatings nano modified using nano-fillers like graphene-based derivatives, nano-clays, self-healing micro-capsules



NIKHIL SHARMA
(Junior Research Fellow)

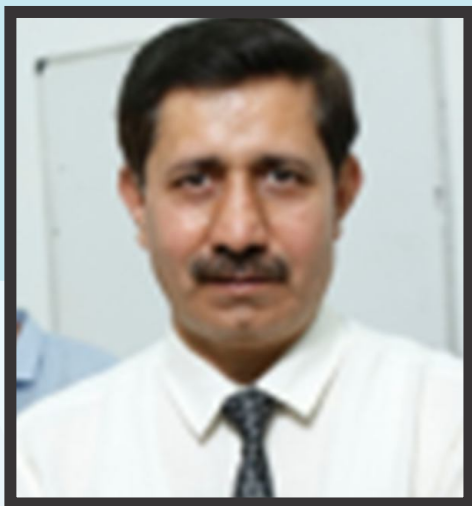


AKANKSHA RANADE
(Junior Research Fellow)

“TIET-VT CEEMS is a collaborative research center set up by TIET, Patiala and Virginia Tech, USA providing engineering and science researchers the opportunity and platform for excelling in frontier materials. I am extremely grateful for being a part of CEEMS and able to carry out research which would in turn be beneficial for the society. CEEMs provided me with abundant facilities for consistent and quality working of my research work namely, Parr 5500 series compact autoclave reactor with 4848 reactor

controller; Fume hood; Carbon dioxide cylinders along with heater and regulator, Micropipettes, Hot air oven, Refrigerator, FTIR, Distillation unit, weighing balance, chemicals and other glassware. The work environment in the center is also ideal for breeding great ideas and innovation.”

Research area: Chemical sequestration of carbon dioxide to yield degradable terpolymer.



FACULTY CORNER

Dr. RAJESH KHANNA

Professor, ECED

Senior Member, IEEE, Fellow IETE

Dr. Rajesh Khanna is a self-motivated and highly passionate, alumnus of Regional Engineering College, Kurukshetra (Presently known as NIT), Indian Institute of Sciences (IISc) Bangalore and Thapar Institute of Engineering and Technology, Patiala. Dr Khanna is committed to excellence in teaching, fundamental research, service to the technical community, and the generation of scholarship in students. Out of 33 years of his work life, he has experience of working across diverse organizational landscapes including the Haryana State Electronics Development Corporation (HARTRON), Ministry of Information and Broadcasting (MI&B) and TIET Patiala.

For 11 years he was associated with the industrial research in the area of Electronics and Communication with significant contribution in carrying out several research projects of Electronic Instruments for various industries around Ambala, while working for HARTRON from 1988 to 1993. He worked in **High Power Transmitters** of All India Radio Jalandhar from 1993 to 1999 and executed various projects like Installation of Dynamic carrier controller, design of Antenna Tuning Unit for AIR Jalandhar and URDU service transmitters, establishing satellite and ground station link etc. There he has handled many instruments of LF and RF range at High Power transmitters. In charge of up linking and broadcasting of Semi-final match between West Indies and Australia in **1996 Wills world cup Cricket match** organized by India at Mohali.

For the last 21 years at TIET, besides teaching and research, he has contributed at University level as Head, Electronics and Communication Engineering Department, Coordinator of Distance Education

Department and Member of various committees. He has successfully completed a two months course on Special Certificate program in academic practices, at Trinity College Dublin, Ireland in 2018. where he developed competencies related to teaching and learning processes. Besides teaching and research, he is Presently involved as facilitator of various core as well optional modules in Centre of Advanced Academic Practices and Learning (CAPSL) at TIET, Patiala.

His current research work is focused on design and development of antennas for 5G, RFID and Cognitive Radios. He has been the Principal Investigator of various research projects sponsored by Govt. of India agencies like AICTE (All India Council of Technical Council), DST (Department of Science and Technology), UGC (University Grants Commission), ISRO (Indian Space Research organization), DRDO (Defense Research Development organization), DSIR (Department of Scientific and Industrial Research) and NRB (Naval Research Board).

He has developed an "Antenna Research Laboratory" in the department that offers state-of-the-art research and measurement capabilities in Radio Frequency Communications and Devices. The Antenna Research Lab supports research, analysis, modeling, testing and development efforts related to antennas and high frequency electromagnetic systems. This type of lab exists at only a handful of universities in the Northern region of India.

At TIET, he has attracted research projects worth 307 lakhs, organized various faculty development programmes and conferences. He has guided 26 PhD

and 90 ME/MTech thesis and presently 10 candidates are working under him for PhD. He has widely published over 105 peer reviewed SCI publications. He is member of academic and research bodies of various universities and government institutes. He is currently the Chairman of Ethical Committee of Government Rajendra Medical College, Patiala also. Personally he is driven by the need to contribute to and master whatever he is engaged with. Efficiency, effectiveness, high quality, impact driven approach are his key focus. He is a firm believer of team work and take complete accountability for the work he is responsible for. His few achievements are

- Best maintained station award for High Power Transmitter, Goraya
- Appreciation Letter from Chief Engineer (North Zone) All India Radio, New Delhi
- Awarded Performance Incentive at TIET, Patiala for continuous 7 years



FACULTY CORNER

Dr. HARI SHANKAR SINGH

Assistant Professor, ECED

Dr. Singh has obtained Ph.D. degree from the Department of Electronics Engineering, IIT (BHU), Varanasi in 2015. Currently, he is working as an Assistant Professor in the Department of ECE, TIET. He is founder of startup M/s HAMA IoT Solutions Private Limited, Sonbhadra, UP, India (incubated at TIDES IIT Roorkee under the scheme of DST NIDHI PRAYAS). He has more than 10 years of research experience in the field of microwave antennas for biomedical and wireless applications. He has published more than 40 research papers in referred international journals and more than 45 research papers published/presented in national and international conferences/ symposium/ workshops. Currently, Dr. Singh is handling a project "Development of Integrated Smart RF Device Using Metamaterial for IoT Applications" sanction under DST NIDHI PRAYAS. His current research includes microstrip antenna and their biomedical applications, artificial materials & their applications, MIMO antenna systems, mobile antennas, and multiple antennas-user interactions.

He has received "Best Ph.D. Thesis" Award in 3rd IEEE UPCON 2016 conference, held in IIT (BHU), Varanasi during 09-11 December 2016. He has been awarded Young Scientist Travel Grant support from DST SERB, Government of India, to attend the ACES-2017, Firenze, Italy. He has delivered several invited talk in various events organized across India. He has also organized hands-on training/FDP sponsored by IEEE Delhi Chapter and ATAL (AICTE Training and Learning Academy), Government of India. His biography is included in Marquis Who's Who in the World in 2016 to 2020 edition. He has awarded Marquis Lifetime Winner 2017. He has visited many countries to attend and present his research papers in conferences.

Dr. Singh is having expertise in design and development of various RF structures including artificial materials. Moreover, he has published various research articles related to the antennas and metamaterial for various cutting edge technologies. The major research work of Dr. Singh is inclined towards;

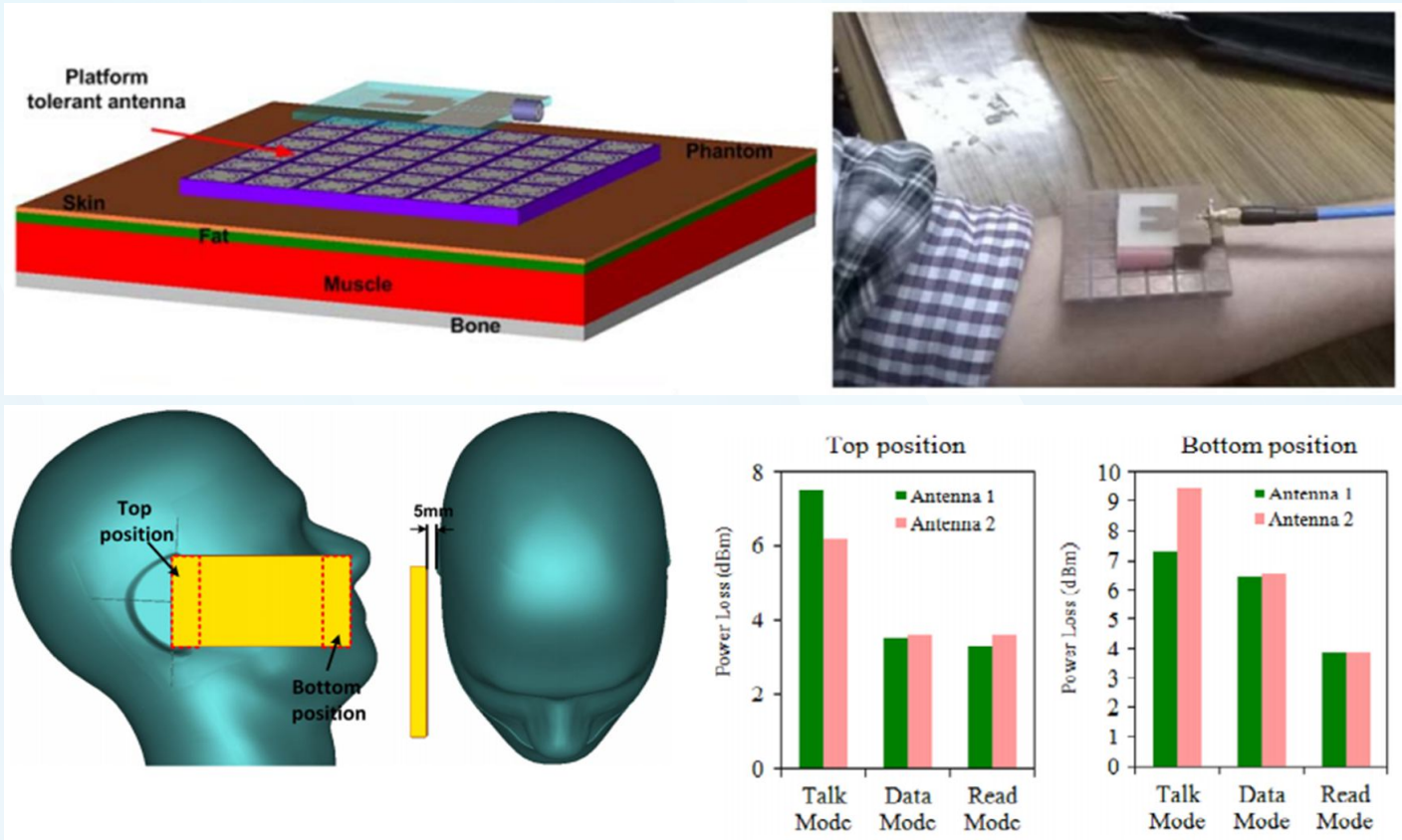
- Development of planar/conformal antennas for biomedical application
- Investigation of antennas in the user proximity (Human body and mobile phone)
- Design and development of metamaterial absorber
- Design and development of planar MIMO antennas

Some of the key research highlights are given below;

- *A low profile platform tolerant antenna system with AMC is designed.*
- *The AMC structure is a simple triple band structure having planar array of unit cells.*
- *The results show that the proposed UWB antenna with AMC structure having platform tolerant properties when placed on large metallic plate and body model for on body applications.*
- *In this study, three kinds of user effects on previously proposed antenna are considered, namely, "Specific Anthropomorphic Mannequin (SAM) head and PDA hand (Talk mode)", "Personal Digital Assistants (PDA) hand (Data mode)", and "Dual hands (Read mode)".*
- *There are two different positions of the quad band*

antenna over mobile circuit board is considered i.e., antenna at top position and

- The specific absorption rate (SAR) for American standard (1.6 W/kg average over 1 g tissues) and European standard (2 W/kg average over 10 g tissues) is calculated for the top and bottom position of the MIMO antenna elements and it is found that the values of SAR is well below the standard limit of FCC as well as European standard. bottom position of mobile circuit board.

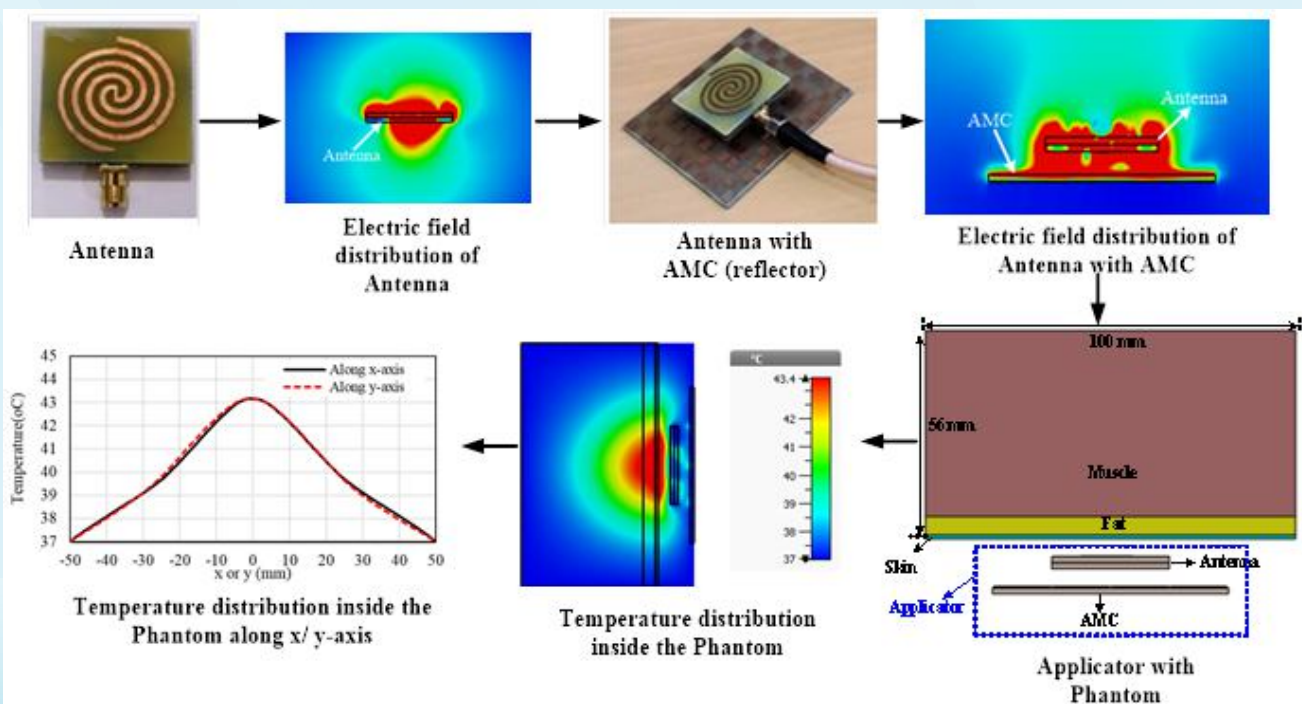


JUNIOR RESEARCH FELLOW CORNER



NITIKA SHARMA
(Junior Research Fellow)

Nitika Sharma is working as a Research Scholar under the supervision of Dr. Rajesh Khanna, Dr. Amanpreet Kaur, and Dr. Hari Shankar Singh in the Department of Electronics and Communication Engineering and JRF in TIET-Virginia Tech Center of Excellence in Emerging Materials. She is working on the “Design and Development of Graphene-based Lens/Double Spiral) Antennas for RF Hyperthermia Treatment”. Hyperthermia is a type of treatment in which affected tissue or tumor cell heated from the temperature range of 40-45 °C helps damage and kill cancer cells with little or no harm to normal tissue. Many techniques may be used to increase the temperature for Hyperthermia treatment, like lasers, heating fluids, probes, and radio frequency (RF) applicators. She will design an RF applicator to generate the heat for hyperthermia treatment. The applicator may be invasive and non-invasive. She is going for non-invasive RF applicator that provides a uniform distribution of RF energy or heat and gives enough energy penetration inside the tumor tissue. She also uses an Artificial magnetic conductor (AMC) as a reflector for high energy penetration. She has designed a compact Double Spiral Antenna that provides high energy penetration inside the tissue and makes a more focused electric field using a reflector (AMC). She has also presented a research paper in “IEEE Indian Conference on Antenna and Propagation (InCAP 2021)”. In the future, she is considering designing a Lens applicator that provides a focused penetration of energy in the tumor tissue without affecting the normal tissues. She aims to develop a compact, low-cost, and easy-to-handle applicator for deep tissue located tumours.



RESEARCH HIGHLIGHT

Design and Development of Graphene-based Lens/Double Spiral) Antennas for RF Hyperthermia Treatment

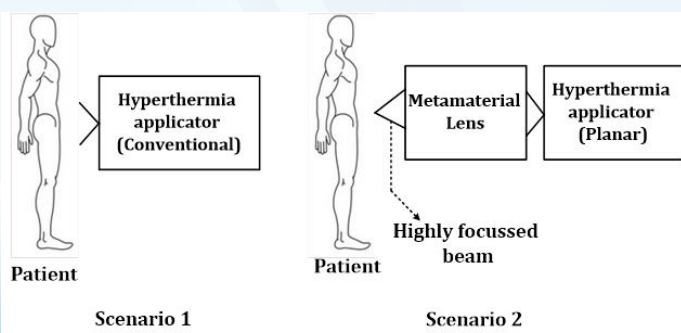
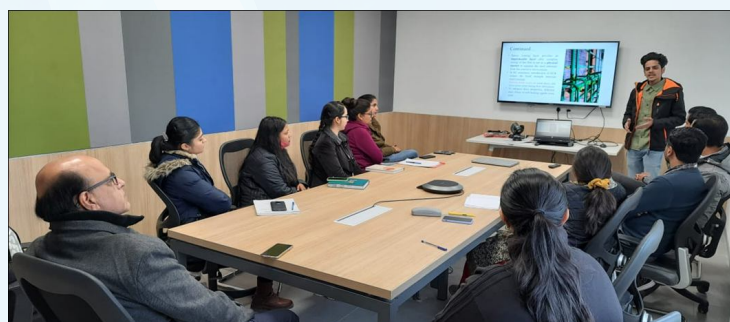
Background:

Hyperthermia is a therapeutic technique that has received increasing attention in recent years. It is a type of cancer treatment in which tissue area is exposed to high temperature. Research has shown that high temperatures can damage and kill cancer cells, usually with minimal injury to normal tissues. By killing cancer cells and damaging proteins and structures within cells, hyperthermia may shrink tumours. The localized increase in temperature could be achieved by means of radio-frequency (RF) exposure of the affected area.

So far, numbers of microwave applicators have been developed for hyperthermia and work is on progress to improve the penetration depth (PD) of the microwave in tissues using different waveguide applicators. Moreover, planar antennas have also been developed as hyperthermia applicator to treat the cancerous tissue. To improve the characteristics of planar antennas such as large bandwidth, effective field sizes (EFS), directive radiation pattern and, high depth of penetration of planar applicators, various techniques have been deployed. However, unresolved challenges are non-uniform field distribution in close proximity of tumours, larger applicator size, and non-directional pattern of the antenna. Therefore, with extraordinary electrical and optical properties of metamaterial (MTM) lens will be one of the key factors to resolve the above challenges. MTM lens will not only suppress the back field of antenna but also direct the field to the patient side (as shown in given below figure). Metamaterial lens has the potential to provide a focussed beam, uniform field distribution, and enhanced penetration depth in the bio-medium/bio-media phantom. Hence, now-a-days metamaterial lens based applicator attracted the researchers' attention due to their several advantages over conventional antennas.

Outcomes:

The outcomes of the project would demonstrate the design guideline of a miniaturized applicator with artificial materials for hyperthermia treatment of superficial tumors. Further, the analysis of superficial oval-/irregular-shaped abdominal/ limb tumors lying inside the muscle tissue with the microwave applicator would help to the healthcare industries to develop efficient hyperthermia applicator.



LIST OF PROJECTS UNDER DIFFERENT THRUST AREAS

I. Bio-x

1. Design and development of graphene based (lens/double spiral) antennas for RF hyperthermia.

PI: Dr. Rajesh Khanna (ECED), Co-PIs - Dr. Amanpreet Kaur (ECED), Dr. Hari Shankar (ECED) and Dr Mayank Agarwal (ECED)

2. Treatment of gastric cancer by activation of natural immunity using helicobacter pylori coated with iron-oxide nanoparticles: in silico, in vitro, and in vivo approaches.

PI: Dr. Diptiman Choudhary (SCBC), Co-PI - Dr. Amrik Sen (SOM)

3. Computational and experimental investigation for optimizing the magnetic nanoparticles hyperthermia.

PI: Dr. Neeraj Kumar (MED), Co-PIs-Dr. B.N. Chudasama (SPMS) and Dr. Pramod K Avti (PGIMER)

4. Design and development of graphene derived antimicrobial composite system to resist air and water borne infection in under-developed areas of India.

PI: Dr. Anoop Kumar (SEE), Co-PI - Dr. Diptiman Choudhury (SCBC)

5. Miniaturized bio-implantable MICS and ISM band antennas for biomedical devices.

PI: Dr. Jaswinder Kaur (ECED), Co-PIs - Dr. Rajesh Khanna (ECED) and Dr. Deepti Mittal (EIED)

6. Remote diagnosis and Health monitoring using smart phone based VCSEL with an Embedded 2D Material.

PI: Soumendu Jana (SPMS)

7. Development of nanobiocomposites as next generation arsenals against biofilms.

PI: Dr. Moushumi Ghosh (BTD), Co-PI - Dr. B N Chudasama (SPMS)

Seed Money

8. Design and development of nano-coated antimicrobial composite system to resist air and water borne infection in under-developed areas of India.

PI: Dr. Anoop Kumar (SEE)

9. Development of high-end protein-rich animal feed from Jellyfish and standardization of industrial-scale production.

PI: Dr. Diptiman Choudhury (SCBC)

10. Graphene oxide coating of titanium screws used in prosthetic joints and its in-vitro assessment of antimicrobial activity and cytotoxicity: A feasibility study.

PI: Prof. Dinesh Goyal (BTD), Co-PIs - Dr Deepa Mudgal (BTD) and Dr. Siddharth Sharma (BTD)

11. VOx@graphene electrochemical high sensitivity and selectivity for H₂O and Dopamine.

PI: Dr. Loveleen Kaur Brar (SPMS), Co-PI - Dr. O. P. Pandey (SPMS)

12. Design of magnetic nanoparticles exhibiting thermo chemotherapeutic effects specific to cancer cell.

PI: Dr. Manoj Baranwal (BTD), Co-PI - Dr. B.N. Chudasama (SPMS)

13. Construction of enzyme-metal hybrid catalysts for concurrent chemo-enzymatic reactions.

PI: Dr. Vikas Tyagi (SCBC), Co- PI - Dr. Banibrata Maity (SCBC)

II. Coal-derived graphene –x

1. Synthesis of Graphene oxide and reduced Graphene oxide from coal, and scale-up of the process.

PI: Dr. Rajeev Mehta (CHED), Co-PIs - Dr. Soumen Basu (SCBC) and Dr. Neetu Singh (CHED)

2. Synthesis of GQDs and CQDs from different precursors for fluorometric detection of biomolecules/ metal ions: A detail comparison study.

PI: Dr. Soumen Basu (SCBC), Co- PI - Dr. Banibrata Maity (SCBC)

3. Utilization of non-biodegradable wastes for development of carbon and carbon supported nano/2D structures for sustainable energy.

PI: Dr. O. P. Pandey (SPMS)

4. Synthesis of carbon dots powder and films for the evaluation of latent fingerprints. state metal ions.

PI: Dr. Soumen Basu (SCBC), Dr. Shagun Kaith, RA (SCBC)

5. Impact of surface engineering in carbon dots for detection of multiple oxidation.

PI: Dr. Soumen Basu (SCBC), Dr. Shagun Kaith, RA (SCBC)

Seed Money

6. Nano-bubbles enhanced froth flotation process for replacement of acid treatment step in coal to graphene oxide/multilayer graphene process.

PI - Dr. Neetu Singh (CHED)

III. Graphene-x-polymer nanocomposites

1. Graphene based epoxy coatings for corrosion inhibition in reinforcing bars in concrete.

PI: Dr. Shruti Sharma (CED), Co-PIs - Dr. Sandeep Sharma (MED) and Dr. Rajeev Mehta (CHED)

2. Structural health monitoring of structures retrofitted with graphene-FRP composites.

PI: Naveen Kwatra (CED), Co-PI - Dr. Himanshu Chawla (CED)

3. Synthesis of organic compounds with effective functional groups to act as migratory corrosion inhibitors for RC structure.

PI: Dr. Shweta Goyal (CED), Co-PI - Dr. Vijay Luxmi (SCBC)

Seed Money

4. Non-stoichiometric metal oxide@porous carbon-polyvinyl difluoride based membranes for oxygen sorption from air.

PI: Dr. Raj Kumar Das (SCBC), Co-PI - Prof. Bonamali Pal (SCBC)

5. Coal derived graphene reinforced hybrid glass/carbon fiber epoxy nano composites for improved impact resistance.

PI: Dr. Sandeep K. Sharma (MED) Co-PI - Dr. Rajeev Mehta (CHED)

6. Sustainable concrete using epoxy nano-composite coatings utilizing coal derived graphene and its derivatives.

PI: Dr. Shruti Sharma (CED), Co-PI - Dr. Rajeev Mehta (CHED)

IV. Exploratory research including applications

1. Chemical sequestration of carbon dioxide to yield degradable terpolymers.

PI: Dr. Rajeev Mehta (CHED), Co-PI - Dr. Amjad Ali (SCBC)

2. Design and development of graphene-based microwave device for stealth applications.

PI: Dr. Rana Pratap Yadav (ECED), Co-PI - Dr. Soumen Basu (SCBC)

3. Development of low-cost and highly conductive carbon-nanotube/graphene sensors based physiological recording system.

PI: Dr. Mandeep Singh (EIED), Co-PIs - Dr. K.S. Sandha (ECED) and Dr. Moon Inder Singh.

4. Triglyceride/glycerol transformation into value added products employing heterogeneous catalysts.

PI: Dr Amjad Ali (SCBC), Co-PI - Dr B N Chudasama (SPMS)

5. Hydrogen production from water splitting and industrial waste solvents by graphene oxide coated metal TiO₂ nanocatalysts under solar radiation.

PI: Dr. Bonamali Pal (SCBC)

6. Multifunctional 1, 8-naphthalimide derivatives for biological and medicinal applications.

PI: Dr. Kamaldeep Paul (SCBC)

Seed Money

7. Flexible lead-free piezoelectric energy harvesting device for wearable applications.

PI: Dr. Jayant Kolte (SPMS), Co-PI - Dr. Jayant, Dr. Puneet

8. Sensor using graphene oxide and anodic aluminium oxide (Al₂O₃) for condition monitoring of power transformer and SF₆ circuit breaker.

PI: Mr. Shailesh Kumar (EIED)

9. Food quality monitoring using novel graphene based microstrip antenna sensor.

PI: Dr. Jaswinder Kaur (ECED), Co-PI - Dr. Rajesh Khanna (ECED)

10. VOx@graphene electrochemical high sensitivity and selectivity for H₂O and dopamine.

PI: Dr. Loveleen Kaur Brar (SPMS), Co-PI - Dr. O. P. Pandey (SPMS)

11. Synthesis and stabilization of biogenic selenium nanoparticles (BioSeNPs) using biocompatible matrices.

PI: Dr. N.Tejo Prakash (SEE), Co-PI - Dr. Ranjana Prakash (SCBC)

PEOPLE

Name	Designation	Department/School	Web link	Photograph
Dr. Roop Lal Mahajan	Thapar Chair Professor-CEEMS Lewis A. Hester Chair Professor of Engineering Global Ambassador, Institute for Critical Technology and Applied Science (ICTAS)	Department of Mechanical Engineering Virginia Tech, Falls Church, VA 22043	https://me.vt.edu/people/faculty/mahajan-roop.html	
Dr. Rajeev Mehta	Professor & Head, Chemical Engineering Department Coordinator, CEEMS	Department of Chemical Engineering, Thapar Institute of Engineering and Technology, Patiala, Punjab, India 147004	http://ched.thapar.edu/facultydetails/OTE1	
Dr. Ajay Batish	Professor, Dean Partnerships and Accreditation, and Deputy Director	Mechanical Engineering Department	http://med.thapar.edu/facultydetails/	
Dr. Amjad Ali	Professor	School of Chemistry and Biochemistry	http://scbc.thapar.edu/facultydetails/MTMyOA==	
Dr. Amanpreet Kaur	Assistant Professor	Department of Electronics and Communication Engineering	http://eced.thapar.edu/facultydetails/MTlyMg==	
Dr. B. N. Chudasama	Assistant Professor	School of Physics and Material Science	http://spms.thapar.edu/facultydetails/NzA3	

PEOPLE

Name	Designation	Department/School	Web link	Photograph
Dr. M. Ghosh	Professor	Department of	http://btd.thapar.Biotechnologyedu/f/Odk5	
Dr. B. Pal	Professor	School of Chemistry and Biochemistry	http://scholar.google.co.in/citations https://www.researchgate.net/profile/Bonamali_Pal2	
Dr. Diptiman Choudhury	Assistant Professor	School of Chemistry and Biochemistry	http://thapar.edu/faculties/view/Dr.-Diptiman-Choudhury/Mzk=/MTE=	
Dr. Himanshu Chawla	Assistant Professor	Department of Civil Engineering	http://ced.thapar.edu/facultydetails/OTQ4	
Dr. Hari Shankar	Assistant Professor	Department of Electronics and Communication Engineering	http://eced.thapar.edu/facultydetails/MTI0Ng==	
Dr. Karmjit Singh Sandha	Assistant Professor	Department of Electrical and Instrumentation Engineering	http://thapar.edu/faculties/view/Dr.-Karmjit-Singh-Sandha/MjY4/MTU=	



PEOPLE

Name	Designation	Department/School	Web link	Photograph
Dr. Moon Inder Singh	Assistant Professor	Department of Electrical and Instrumentation Engineering	http://www.thapar.edu/faculties/view/Moon-Inder-Singh/MTA3/Nw==	
Dr. Mandeep Singh	Professor	Department of Electrical and Instrumentation Engineering	http://www.thapar.edu/faculties/view/Dr.-Mandeep-Singh/MTAw/Nw==	
Dr. Naveen Kwatra	Professor	Department of Civil Engineering	http://ced.thapar.edu/facultydetails/OTM5	
Dr. Neetu Singh	Associate Professor	Department of Chemical Engineering	http://ched.thapar.edu/facultydetails/OTIz	
Dr. Neeraj Kumar	Associate Professor	Department of Mechanical Engineering	http://med.thapar.edu/facultydetails/MTE3OQ==	
Dr. O. P. Pandey	Senior Professor	School of Physics and Materials Science	http://www.thapar.edu/faculties/view/Dr.-O.P.-Pandey/NDM=/MTQ=http://scholar.google.co.in/citations?user=ADG1jUoAAAAJ&hl=en&oi=ao	




PEOPLE

Name	Designation	Department/School	Web link	Photograph
Dr. Pramod Kumar Avti	Associate Professor	Department of Biophysics, PGIMER Chandigarh	https://orcid.org/0000-0001-5603-4523	
Dr. Prasenjit Basak	Associate Professor	Department of Electrical and Instrumentation Engineering	http://www.thapar.edu/faculties/view/Dr.-Prasenjit-Basak/MjU5/Nw==	
Dr. Rana Pratap Yadav	Professor	Department of Electronics and Communication Engineering	http://eced.thapar.edu/facultydetails/MTlxMw==	
Dr. Shailesh Kumar	Assistant Professor	Department of Electrical and Instrumentation Engineering	http://thapar.edu/faculties/view/Shailsh-Kumar/MzEy/Nw==	
Dr. Shruti Sharma	Professor	Department of Civil Engineering	https://ced.thapar.edu/facultydetails/OTQx	
Dr. Sandeep Kumar Sharma	Associate Professor	Department of Mechanical Engineering	https://med.thapar.edu/facultydetails/MTE1Ng==	


POST-DOCTORAL FELLOWS

Name	Designation	Department	Faculty	Photograph
Dr. Shagun Kainth	PDF	School of Chemistry and Biochemistry	Dr. Rajeev Mehta Dr. Roop L. Mahajan	
Dr. Piyush Sharma	PDF	Center of Excellence in Emerging Materials	Dr. Soumen Basu Dr. Roop L. Mahajan	

RESEARCH FELLOWS

Name	Designation	Department	PhD Supervisors	Photograph
Ms. Aayushi	JRF	School of Chemistry and Biochemistry	Dr. S. Basu, Dr. Banibrata Maity	
Ms. Anushka Garg	JRF	School of Chemistry and Biochemistry	Dr. Rajeev Mehta (CHED) Dr. Soumen Basu (SCBC)	
Mr. Gurmeet Singh	JRF	Department of Mechanical Engineering	Dr. Neeraj Kumar (MED) Dr. Bhupendra Kumar Chudasama (SPMS) Dr. Pramod K Avti (PGIMER)	



RESEARCH FELLOWS

Name	Designation	Department	PhD Supervisors	Photograph
Mr. Jaydeep Panchal	JRF	Department of Electrical and Instrumentation Engineering	Dr. Mandeep Singh (EIED) Dr. K.S. Sandha (EIED) Dr. Moon Inder Singh (EIED)	
Mr. Karanveer Singh	JRF	School of Chemistry and Biochemistry	Dr. B. Pal (SCBC)	
Ms. Komal Attri		School of Chemistry and Biochemistry	Dr. Diptiman Choudhury (SCBC) Dr. Amrik Sen (SOM)	
Ms. Mandeep Kaur		Department of Civil Engineering	Dr. Naveen Kwatra (CED) Dr. Himanshu Chawla (CED)	
Ms. Nitika Sharma		Department of Electronics and Communication Engineering	Dr. Rajesh Khanna (ECED) Dr. Amanpreet Kaur (ECED) Dr. H. S. Singh (ECED)	
Mr. Nikhil Sharma		Department of Civil Engineering	Dr. Shruti Sharma (CED) Dr. Sandeep K. Sharma (MED) Dr. R. Mehta (CHED)	

RESEARCH FELLOWS

Name	Designation	Department	PhD Supervisors	Photograph
Mr. Sandeep Kumar	NET-JRF (UGC)	School of Mathematics	Dr. Amrik Sen (SOM) Dr. Diptiman Choudhury (SCBC)	
Mr. Anmol Jain		School of Chemistry and Biochemistry	Dr. Kamaldeep Paul	
Ms. Sonia Rani		School of Chemistry and Biochemistry	Dr. Shweta Goyal Dr. Vijay Luxami	
Ms. Sayantani Bhattacharya		Department of Biotechnology	Dr. Moushumi Ghosh Dr. B.N. Chudasama	
Ms. Anshu Tyagi		School of Chemistry and Biochemistry	Dr. Amjad Ali Dr. B.N. Chudasama	
Mr. Vikash Ranjan		Electrical and Instrumentation Engineering Department	Dr. Shailesh Kumar Dr. Prasenjit Basak	

RESEARCH FELLOWS

Name	Designation	Department	PhD Supervisors	Photograph
Mr. Sandeep Nain		Department of Mechanical Engineering	Dr. Neeraj Kumar Dr. Pramod Kumar Avti	
Mr. Pritam Hait		School of Chemistry and Biochemistry	Dr. Soumen Basu Dr. Rajeev Mehta	



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