PROGRESS REPORT & PORTFOLIO 2022-2023

CENTRE FOR ADVANCED ELECTRONICS & PHOTOVOLTAIC ENGINEERING (CAEPE)

INTERNATIONAL ISLAMIC UNIVERSITY, ISLAMABAD

IsDB

البنك الإسلامي للتنمية

Islamic Development Bank

• Acknowledging the support extended by the ***Islamic Development Bank (IsDB), Kingdom of Saudi*** Arabia for the internationally competitive ***Technical Assistance Grants*** and continuing matching support to the Principal Investigator of the IsDB-funded projects in order to ensure the sustainability and continuation of the outcomes and scientific deliverables of the academic part of the said grants in the Centre and to further the endeavors to submit new grant proposal/intervention aligned with the University's strategic plan (2022-26) and IsDB's STI policy.


بسم الله الرحمن الرحيم

H.E. Dr. Arif-ur-Rehman Alvi
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Prof. Dr. Ahmad Salem Muhammad Al - Ameri
Pro Chancellor, IIUI

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Rector, IIUI

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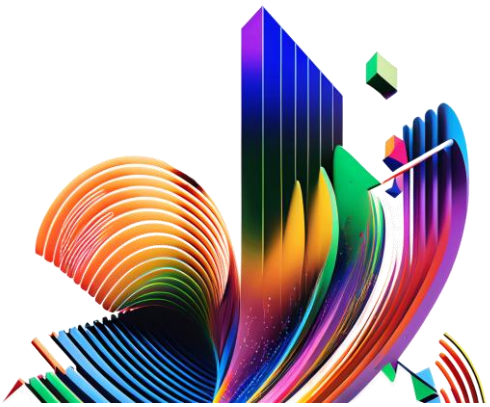
President, IIUI

Engr. Prof. Dr. Ahmed Shuja Syed
Founding Executive Director (CAEPE)

CONTENT

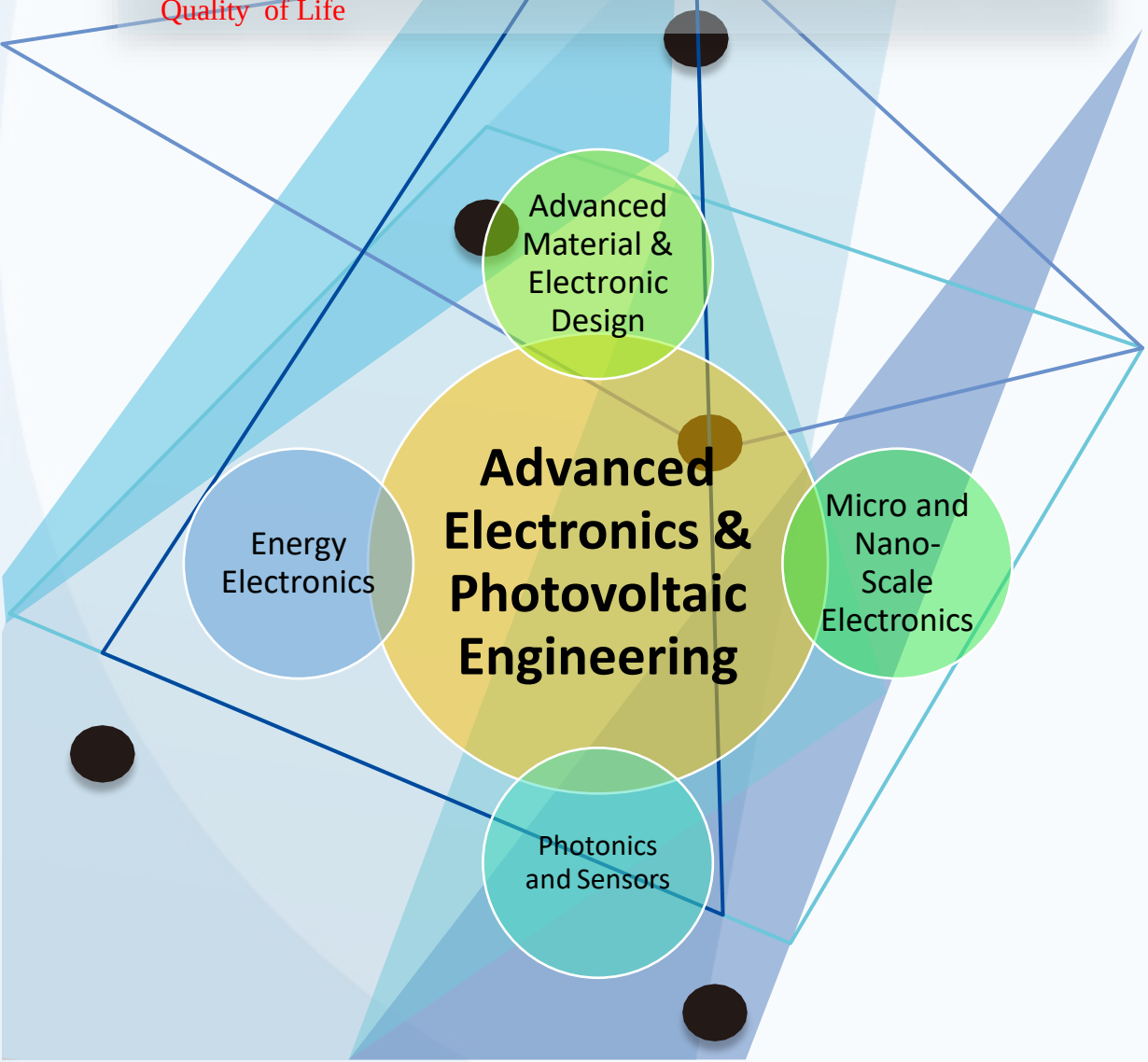


Introduction

About the Centre

The Centre for Advanced Electronics & Photovoltaic Engineering (CAEPE) at International Islamic University, Islamabad is a university-wide Centre aimed to create knowledge and develop the cross-disciplinary market-driven research focused on the applications of Advanced Electronics & Photovoltaic Engineering via processes, components and systems. This research and development is important for the convergence of energy, photonic and nano-scale electronics avenues for economic growth in the country. The overall objective of the Centre is to establish a sustainable source of research training for developing qualified manpower with a focus on future requirements, and facility access services in these fields that are applied to the national needs.

- CAEPE is a university wide indigenous Centre and a user-access facility
- Number of Scientific Projects Utilizing the Facilities in the Centre ~ 510+
- Enabling to target 4 Sustainable
- Development Goals (SDGs)
- Centre's Indigenous Research Problems are focused to create knowledge in Micro- and Nano-scale Engineering of Devices, Materials and Systems to enable solutions for Big Problems such as Connectivity, Energy, Improving Quality of Life



BACKGROUND

The Centre for Advanced Electronics duly approved in the 76th meeting of university's Board of Governors was re-named as Centre for Advanced Electronics & Photovoltaic Engineering (CAEPE) in the 80th meeting of the same esteemed board in 2017. Islamic Development Bank (IsDB), KSA's back-to-back international grants paved the way to establish a fully functional state-of-the-art Centre in Pakistan.

VISION

To create knowledge, develop and invent in the emerging areas of electronics and energy technologies.

MISSION

To conduct advanced electronics & photovoltaic engineering research that produces:

- New Technologies
- Processes
- Systems that may provide new or significantly enhanced knowledge for direct benefit to economic opportunity in Pakistan

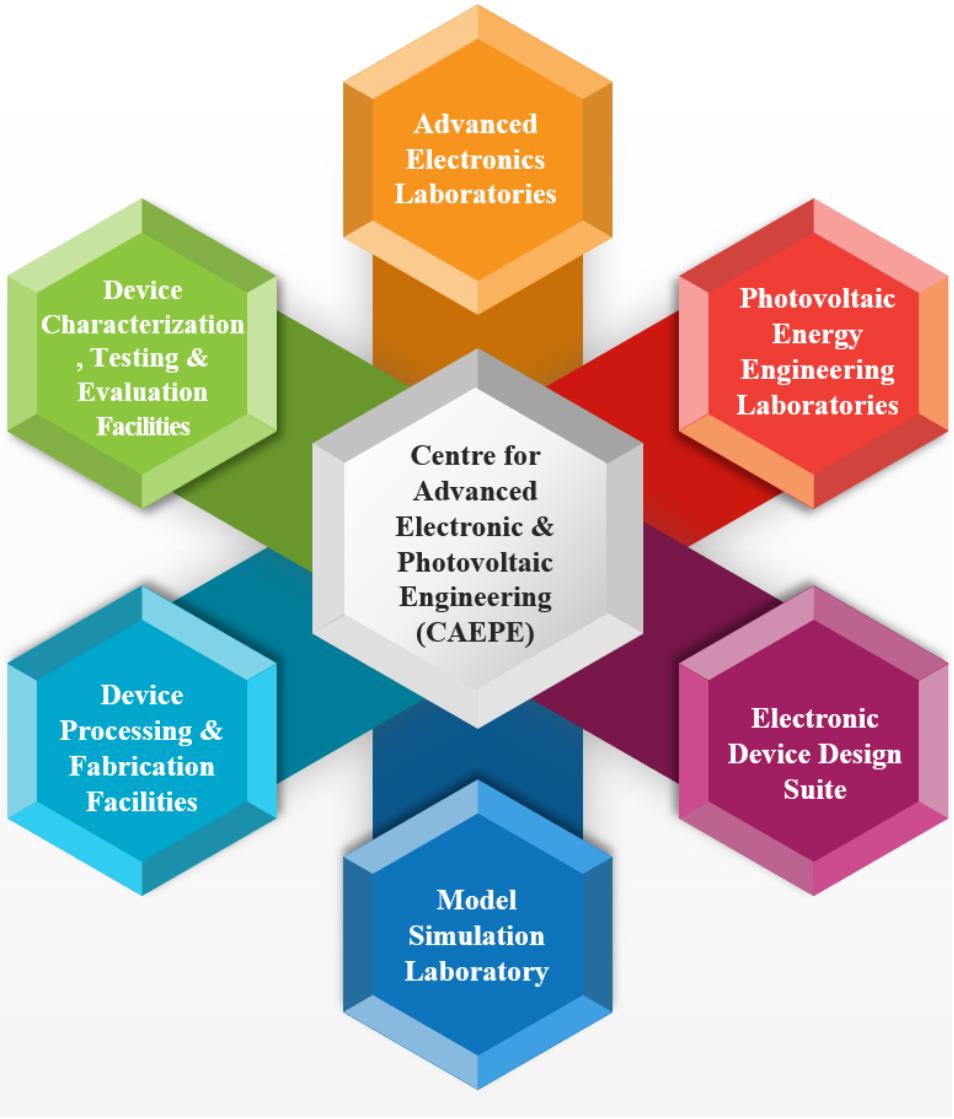
RESEARCH PORTFOLIO

- Technology behind the Chip (Physical Layer Design)
- Semiconductor Fabrication
- Process Reliability
- Materials & Device Characterization
- Internet of Nano Things
- Power & Energy Electronics
- Photonics
- Novel Materials Devices, Circuits & Systems for Sensing, Detection, Communication & Computing

Facilities and Services

FACILITIES

The Centre is equipped with highly sophisticated design and experimental facilities divided into several laboratories:



ELECTRONIC DEVICE DESIGN SUITE

This part of the Centre, incepted in year 2009, is focused to facilitate students and researchers to design and model VLSI/ULSI devices, circuits and systems. The "Design Suite" is equipped with state of the art, trade-off commercial design tools.

Device Modeling and Simulation explores scaling and process development of advanced electronic and photonic devices. These tools cover device transport and performance as well as process modules. These predictive tools help to provide physical insights into new devices, new physical phenomena arising from nano-size geometry, new materials and interfaces.

LAB MISSION

To provide research leadership in electronic design automation by utilizing design and test of advanced electronic circuits and systems.

RESEARCH PORTFOLIO

- Physical, circuit, System level designing and simulation capability
- Licensed Softwares with multifold capabilities to target both the 2D and 3D approach in devices and systems
- Process reliability and optimization techniques
- MEMS designing and evaluation
- Solar cells Simulations

IsDB - FUNDED ADVANCED ELECTRONICS LABORATORIES

The primary objective of this crosscut facility is the development of metrology and characterization tools to support patterning, nano-engineered device processing and overall integrated circuit fabrication for variety of application areas.

The specific focus is on micro- and nano-engineered devices with unique properties that enable continuation of functional scaling, where existing technology tapers off, and supports a research environment and portfolio that explores critical nanometer scale semiconductor manufacturing, facilitating a world-class student resource and measurable value through novel materials, devices and Fab-less manufacturing options.

LAB MISSION

To apply interdisciplinary and bottom-up approaches that enable discovery of novel alternatives to complex Fab-less electronic device design and processes.

RESEARCH PORTFOLIO

- Process Reliability
- Materials & Device Characterization
- Internet of Nano Things
- Power Electronics
- Photonics
- Novel Materials Devices, Circuits & Systems for Sensing, Detection, Communication & Computing

IsDB- FUNDED PHOTOVOLTAIC ENERGY ENGINEERING LABORATORIES

The project is focused to cater the needs for development of the skilled human resource in the broader area of energy research with a special emphasis on PV engineering. The development of this laboratory in International Islamic University, Islamabad is university's first formal initiative to conduct teaching and research and produce trained manpower in this much desired area. In nutshell; the PV Engineering lab's project is targeted to:

- Capacity building of education and research in the PV engineering/energy sector in the country
- Producing high quality S&T manpower in the key areas of science and engineering of Photovoltaic technology

LAB MISSION

To study, research and propose solutions for:

- PV phenomena in semiconductors
- Solar cell focused Multi-junctions, nano-heterostructures, thin-film electronics
- Metrology and Characterization of solar cells and photovoltaic processes for subsequent fabrication and utility

RESEARCH PORTFOLIO

- Technology behind the Chip (Physical Layer Design)
- Photovoltaic Energy harvesting and Engineering
- Solar Cells
- Clean and Green energy
- Defect profiling and half life estimation of PV
- New materials and design for PV and fabrication processes
- Process window evaluation to optimize the performance benchmark
- Energy storage, battery and beyond

MODEL SIMULATION LABORATORY

The Lab is focused to simulate the model cleanroom assisted device design and process knowledge for the students by providing them with the licensed tools and audio-visual facilities. These tools are used to design and simulate the solid-state devices as well as system level computation for diverse application in Nano-electronics, Energy, Optoelectronics and Artificial Intelligence variables.

LAB MISSION

To develop a crosscut training facility as well as providing solution to big problems in design engineering, data analytics, A.I and sensors.

RESEARCH PORTFOLIO

- Technology behind the chip
- Optimization of Processes
- Numerical modelling of solar cells
- Simulation of Opto- and photonic devices
- A.I assisted computing for applications
- Big data analytics

DEVICE PROCESSING & FABRICATION FACILITIES

The Lab has multiple systems that are capable of growing different thin and thick layers, films, device components etc. The processes are designed in such a way that several types of devices can be fabricated. The lab also comprises of the tools that can quantify the process outcomes and provide important information about the fabrication process efficiency.

LAB MISSION

To facilitate the need of in-house growth and fabrication of the devices and systems with optimum accuracy and efficient throughput

RESEARCH PORTFOLIO

- Starting wafer growth
- Physical and Chemical deposition
- Process quantification and verification
- Printable, wearable and casted circuits and devices
- Smart Sensors

DEVICE CHARACTERIZATION, TESTING & EVALUATION FACILITIES

The lab is equipped with the facilities and techniques that can characterize devices that are fabricated in-house. The lab has many diverse systems, targeting different paradigm of research. The lab can characterize solid state devices, sensors, detectors, solar cells, and printed circuits. This crosscut facility has some of the most latest systems that are essential for analysis at material, device and system level.

LAB MISSION

To provide analysis, diagnostics and characterization of Nano structure, films, features, devices, material and systems.

RESEARCH PORTFOLIO

- Magnetic measurements
- Material Composition and planes
- Structural analysis and surface profiling
- Ultra low current measurements
- Optical measurements

Tools and Techniques

Silvaco TCAD	•Physical Layer designing and simulation software with capability to test and optimize the fabrication processes.
Cadence (Analog/Custom/digital IC design bundle)	•System and Circuit level designing and simulation software.
Soft MEMS (Mems Pro)	•To cater with the designing of the Micro-Electro mechanical systems where the systems have some form of moving part. Sensor and multiple detectors can be designed and simulated.
Mentor Graphics HEP	•IC Nanometer design; Design, Verification & Test; PCB Expedition.
IBM SRIM/TRIM and SUSPRE	•Ion Implantation simulations for electronically testing the impact of the different ion on to the sample/device. Mapping the damage and doping profile.
COMSOL	•With this software one can create physics-based models and simulation applications. This Model Builder enables you to combine multi-physics in any order for simulations of real-world phenomena. The Application Builder gives you the tools to build your own simulation application.
Multi-Head Probe Station	•For the characterizations of the systems that are larger in size and containing many different components placed on a single wafer. The system has highly precise probes that can be moved in micrometers through external control to either independently or cumulatively characterized.
Nano-Chip Reliability Grade Hall Effect System	•This is a initial electrical characterization system. The system has the capability to get the required electrical parameters such as mobility, conductivity, carrier concentration, etc.
ASMEC- Electro-Physical Characterization System	•This hyper sensitive system is the consortium of many different techniques with the capability to map the defect levels, Sensitive charge analysis, extremely low conductivity and mobility. The system is also equipped with the capability to lower and increase the temperature of the samples; that way real time efficiency of the devices can be extracted.
Metrology Grade Spectroscopic Ellipsometer	•For mapping the thickness and numerous other optical parameters such as refractive index, extinction coefficient, dielectric coefficient, etc. The machine shines a light on to a sample surface and based on the reflective data and sample model, the optical parameters are extracted.
Atomistic Layer Nanomaster Deposition System	•This system has the capability to deposit extremely thin layers in the regime of nanometers on to the sample surface. The system is the advanced version of the direct current heating system and has the capability to control the growth rate and the end thickness of the layer.

Rapid Thermal Processing (Annealing, Synthesis and RT-CVD System)	• Rapid thermal Processing or RTO is the annealing system with the capability to provide heat flux to the sample surface. The system can provide a constant temperature of maximum 1400°C on to the sample and can achieve this high temperature within few seconds.
Impedance Spectroscopy System	• This system is used for BODE and Nyquist analysis of charge storage devices. The system has the frequency range of milli hertz to kilohertz.
MEMS Grade Spin Coating, Stirring and Baking	• This system is used for spin coating of different materials on the sample/device surface.
Fume Hood/Wet Bench/Dual Glovebox for Sample Preparation, Etching and Cleaning	• These systems are used for clean-environment-specific sample preparation, cleaning, dicing, cleaving and etching of the sample and devices.
Class 100 Clean room	• The facility is equipped with a class 100 cleanroom which is the first one in any educational Institution in Pakistan and is capable of facilitating the fabrication of Nano scale electronics and structures.
Class AAA Sun Simulator with complete diagnostics	• This system is capable of creating wavelength same as our sun so that we can test the solar cell inside the lab. The system is capable of accurately mapping the important parameters of the solar cells such as packing fraction and efficiency.
Plasma Enhanced Chemical Vapour Deposition System	• This system is used for the deposition of different layers through chemical reaction inside a closed chamber. The gases flow is controlled and the reaction potency is maintained for the growth of finer layers.
Magnetron Sputtering System	• This deposition system utilizes sputtering technique where the charged ions of the inert gas such as Argon are used to break the molecule of a material which are then transferred to the sample surface for the creation of a layer.
Scanning Electron Microscopy	• This system is used for the quantification of the sample surface and its composition. The system uses highly charged electrons to interact from the sample surface and gather information of the sample surface features. The system can see features as low as 5 nm.
Temperature Dependent Photo/Electro Luminescence Spectroscopy System	• This system is used for mapping the luminescence effect on the devices. The system uses laser of fixed wavelength to be illuminated on to the sample and the reflected data of light is passed through different analysis equipment to get the optical band gap and other important parameters.
EUV Lithography	• This system is used to transfer the pattern on to the sample/device surface. The system uses ultraviolet light to shine through a mask that is placed in-between the sample and the light source. The sample is quoted with a light sensitive material which changes its properties when exposed to the incoming light. With this system extremely small features in Nano meters in length can be made.

TCAD OMNI	•Physical Layer designing and simulation software with capability to test and optimize the fabrication processes.
AI Assisted Computational Test BED	• A Cloud based Multi Node Tele Health Framework Supported by AI & BIGDATA that can help us easily connect to "different data sources / nodes, which would help to decide the line of action on the basis of numbers, analytics and Trend-forecasting in COVID-19 and similar future pandemic scenarios.
SCAPS	•SCAPS (a Solar Cell Capacitance Simulator) is a one dimensional solar cell simulation programme capable of mapping different important parameters of the solar cell.
CZ Crystal Grower System with Vacuum Chamber for Oxide Single Crystals	•This system is used to make the starting wafers of Silicon for subsequent device manufacturing. The system can be tuned to get the desired doping and mobility ranges in the wafer. (Under procurement)
1200°C Quartz Tube Furnace (2" O.D) with Glove Box Purification System	• The system is capable of providing calculated heat flux to the system with in few second to alter the structural morphology of the device. The system can be used to provide Oxidation and Nitridation to the sample surface.
Electrospinning & Electrosparying Unit for Nano-Materials	•This system is used for the growth of very fine Nano fibers and sacrificial layers. The system is fully automated while using fine control of voltage, spraying angle and delivery amount. One can laydown very fine pattern on to the device surface.
Multi-function Film Coater with Turbo Pump: Thermal Evaporating + Carbon Coating + Plasma Sputtering	•This system uses all the profound physical growth techniques to grow the layers specific to your requirement. The system can chose between different growth strategy to get the optimum results.
Compact Precision Screen Printing Film Coater	•The machine is used to develop and print circuits and systems on to a varity of substrates and surfaces with precise accuracy and low latency.
DC/RF Dual-Head High Vacuum Magnetron Plasma Sputtering Coater with Film Thickness Tracking System	•This system uses both RF and DC techniques to sputter and grow layer on the device surface. This way the process acceptance of the machine is increased and the machine can grow almost all type of films.
PECVD Split Tube Furnace	•The system is capable of chemically grow multiple layer in a single machine operation cycle and can grow different material layers by CVD process. The system has 4 channel gas mixture and can provide low pressure environment for better operation.
Long Tape Casting Coater	•This system is used to laydown the layers of different material on to the long sheets and substrates. The system is profoundly used in the fabrication of solar cells and Super Capacitors.

Femto/Pico ampere meter	•This system is used for ultra low current measurement. The usage of this machine is profound and important when one is working with hyper sensitive electronics.
Film/Coating Thickness Profilometer	•This system uses stylus to move over a surface to profile the roughness, different small pattern that are grown on to the sample surface. The system is of keen interest for the researchers that are working in MEMS, NEMS and Nano structures.
Precision Grinding / Polishing Machine	•This system is used to cure the surface of the device to remove any dupree or any residual from the previous processes. This way the next process preformed on the device will not be hindered.
X-Ray Diffraction	•The system uses X-rays to scan the sample/device to find its composition, its planes and vectors. The system is actively used by material scientists, engineers, biologist and Chemist to examine their samples structures and crystallography.
Atomic Force Microscope & Scanning Probe System	•This system is used to see the atomic structures, bonding and roughness. The system can clearly map the layout of the devices at atomic level.
Vibrating Sample Magnetometer	•This system uses magnets to map the effect of magnetism on to the sample working and characteristics. The system can cool the sample down to liquid nitrogen temperatures and see its output from device perspective.

USAGE & TRAINING

The facility is an open access to IIU students and faculty as well as other universities and scientific organizations on a University's BOG approved Service Cost Model.

Entry into the Centre's facilities requires Safety Training through the Master Users. One should follow the General as well as Specialized Training Requirements to utilize the services. Other specific Health and Safety training may be required depending upon the machine to be used. Your technical contact will provide additional information as needed.

Individual equipment training is required and can be scheduled by contacting the appropriate technical or administrative staff for each facility.

Viable Experience; International & National Relevance

- About 15 Years of Device Design Experience on International Industrial Simulators/ Modeling Tools
- Connected to World-wide FABs
- About 9 years of rigorous Quality Assurance of Centre Process Characterization Tools
- Indigenous Machine Engineering
- Over 510 Nation-wide returning users on variety of projects since the formal inauguration of the facility
- Continuing ties with the strategic organization
- National and International Funded projects on the forefront of Advanced Electronics and Photovoltaic engineering, as part of Centre's portfolio

ACCESS

Access Support

CAEPE, being a leading user facility, has also access to the Epitaxial Growers, Ion Implantation Services, Fabs for Standard CMOS development, III-V Devices, MEMS/ Microsystems applications; with experience in taping out the chips and discrete devices.

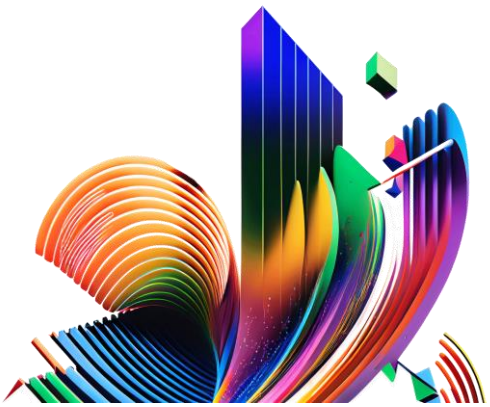
CAEPE is also in collaboration with some of world's top of the line research groups and experimental facilities.

Access to the Centre Facilities

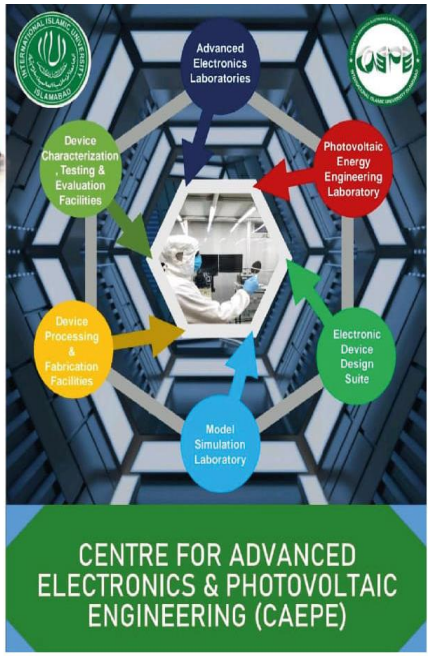
The Centre provides an open access to its facilities for all the users who wish to use its capabilities for their respective research. All the facilities are charged through the CAEPE Service Cost Model

https://www.iiu.edu.pk/caepe

CAEPE is also part of the HEC "Access to Scientific Facilities" program and also part of the experimental repository of Pakistan



Engagement with the Teaching and Research Programs



Centre for Advanced Electronics & Photovoltaic Engineering (CAEPE) at IIUI is a unique research centre with state-of-the-art user facilities and innovative R&D projects. CAEPE is partnering with the Faculty of Engineering & Technology and Faculty of Science for the following exciting programs:

MS/Ph.D. Electrical Engineering

(Hosted by the Department of Electrical & Computer Engineering)

MS/Ph.D. Energy Systems Engineering

(Hosted by the Department of Mechanical Engineering in partnership with CAEPE and Department of Electrical & Computer Engineering)

MS/Ph.D. Nanoscience & Engineering

(Hosted by Centre for Interdisciplinary Research in Basic Sciences in partnership with CAEPE, Departments of Physics and Electrical & Computer Engineering)

Current Academic Program

Centre is the custodian of Department of Electrical Engineering's MS/PhD program with strength in Advanced Electronics stream. Besides Centre is also partnering with Faculty of Engineering and Technology and Faculty of Sciences for MS/PhD Energy Systems Engineering and Nano Science & Engineering Programs.

Facility Usage in Regular Teaching

Hours Undergraduate courses

- Microelectronics technology
- VLSI technology
- Optoelectronics
- Selected FYPs

Almost 100 undergraduate students, both from male and female sections of BS Electrical Engineering Program are being taught in the Centre for hand-on sessions in multiple courses.

Graduate (MS/PHD) Courses offered in the Centre

- Microelectronic Devices
- Microsystems Technology
- Optoelectronic Devices
- Energy Resources
- Microwave and Millimeter-wave Devices
- Advanced Computer Architecture
- Advanced VLSI Design
- Photonic Devices & Circuits
- MEMS and Micromachining
- Advanced Microelectronic Technology
- Advanced Semiconductor Devices
- Modeling and Simulation of Semiconductor Devices
- Photovoltaic Electronics
- Power Semiconductor Devices
- Photovoltaic Material system
- Analytical Methods in Nano-scale Electronics
- Micro fluidics and Lab-on-a-chip Systems
- Advanced Multiprocessor Systems
- VLSI Test Principle and Challenges
- Integrated Circuits (IC) Packaging
- Integrated Chip (IC) Manufacturing Technology
- Semiconductor Device Reliability
- Organic Electronics
- Smart Sensors Technology
- Infrared Detectors & Systems
- Energy Materials Design
- Advanced Thermoelectric Technology
- Special Topics in Nanoelectronics

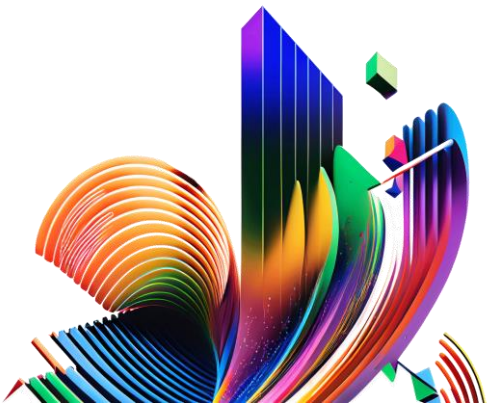
- Advanced Nano-scale Photovoltaics
- Compound Semiconductor Device Processing
- Quantum Information Process Devices
- Computational Nano electronics
- Special Topics in Electronic Design Technology
- Special Topics in Micro and Nanosystem
- Special Topics in Optoelectronics and Photonics
- Fundamentals of Organic Electronics
- Power Converters and Inverters
- Advanced Renewable Energy Sources
- Solar Photovoltaic: Essentials and Applications

Data Statistics

- A large number of students are getting trained, guided and supervised in the Centre since the very inception of the laboratories.

- Each project has an average tenure of almost 1 year for MS and 2-3 years for PhD research students, respectively, for experimental training and facility usage.

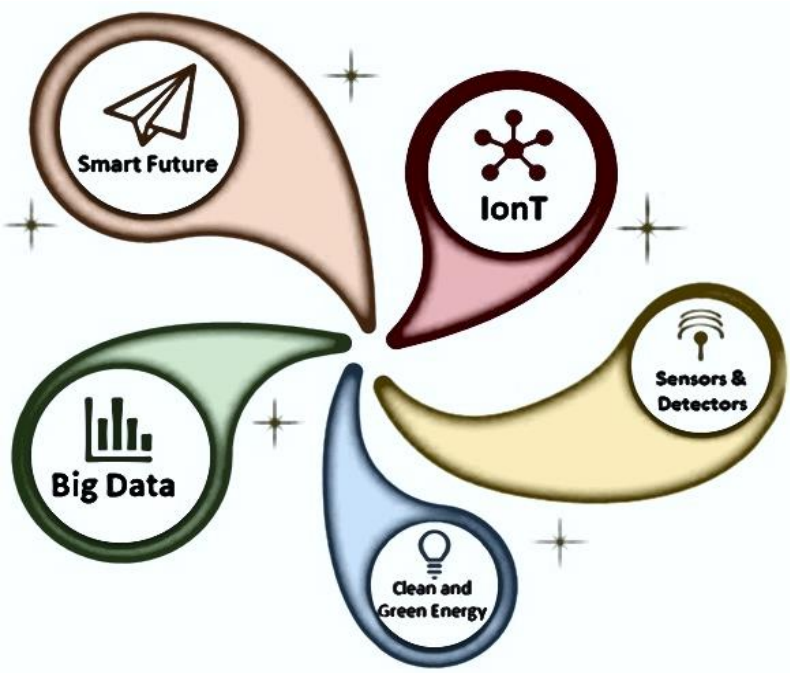
- Currently over 60+ students from graduate programs drawn from the **Department of Electrical Engineering**, **Department of Mechanical Engineering** and **SA-CIRBS** are engaged with the Centre for taught courses and research access and supervision. Students and faculty members from other departments in the university and other organization are separately recorded with unique project's identification numbers.



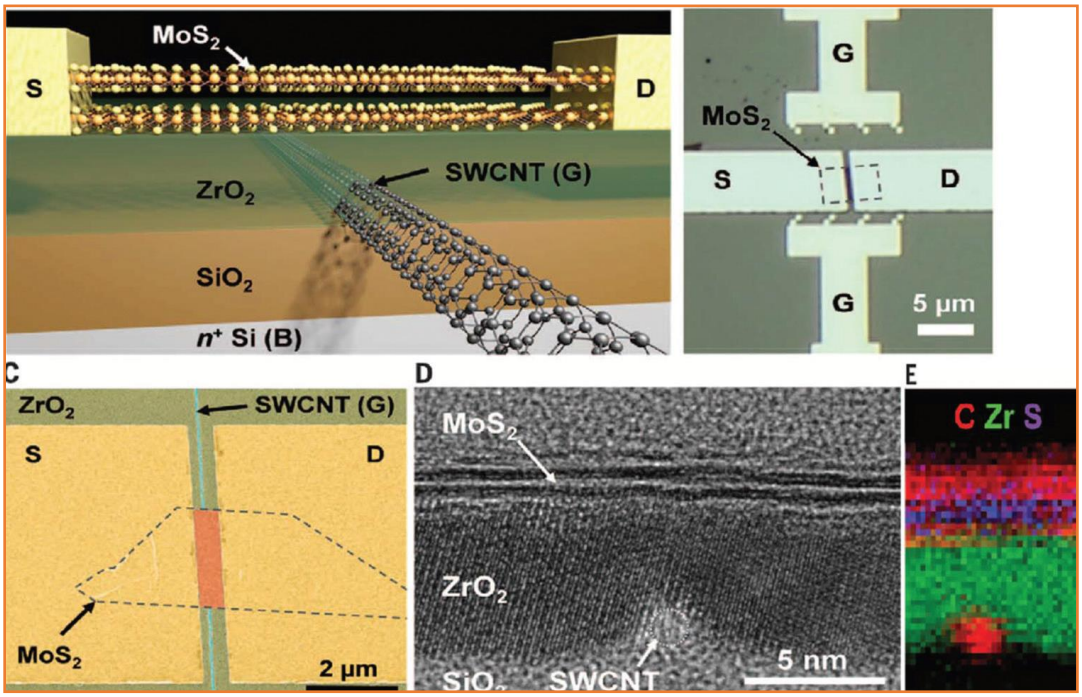
Research and Projects

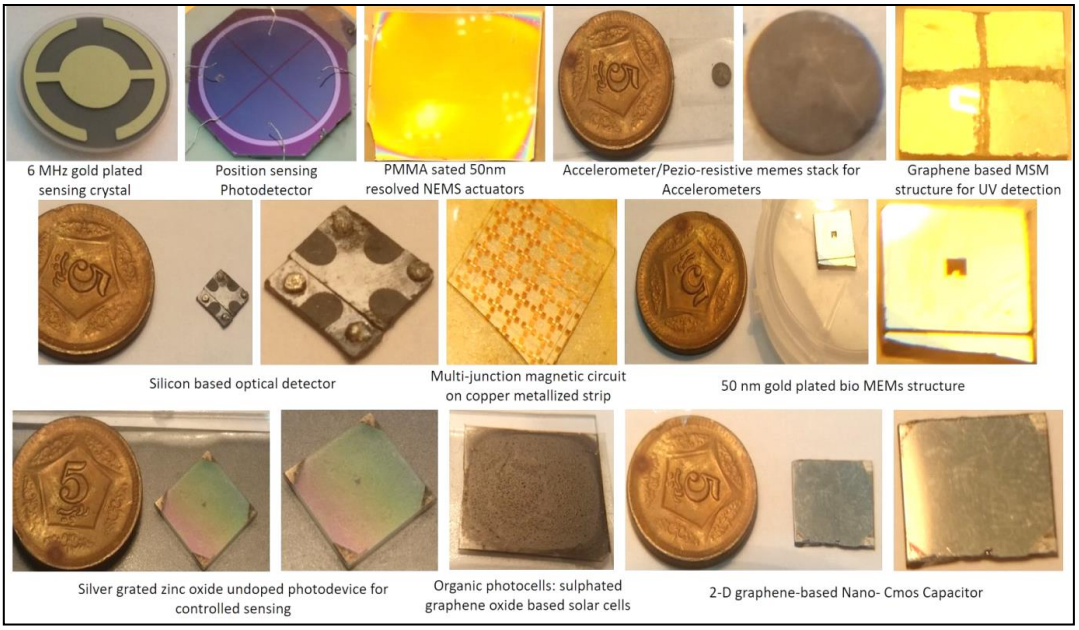
Broader Application Areas

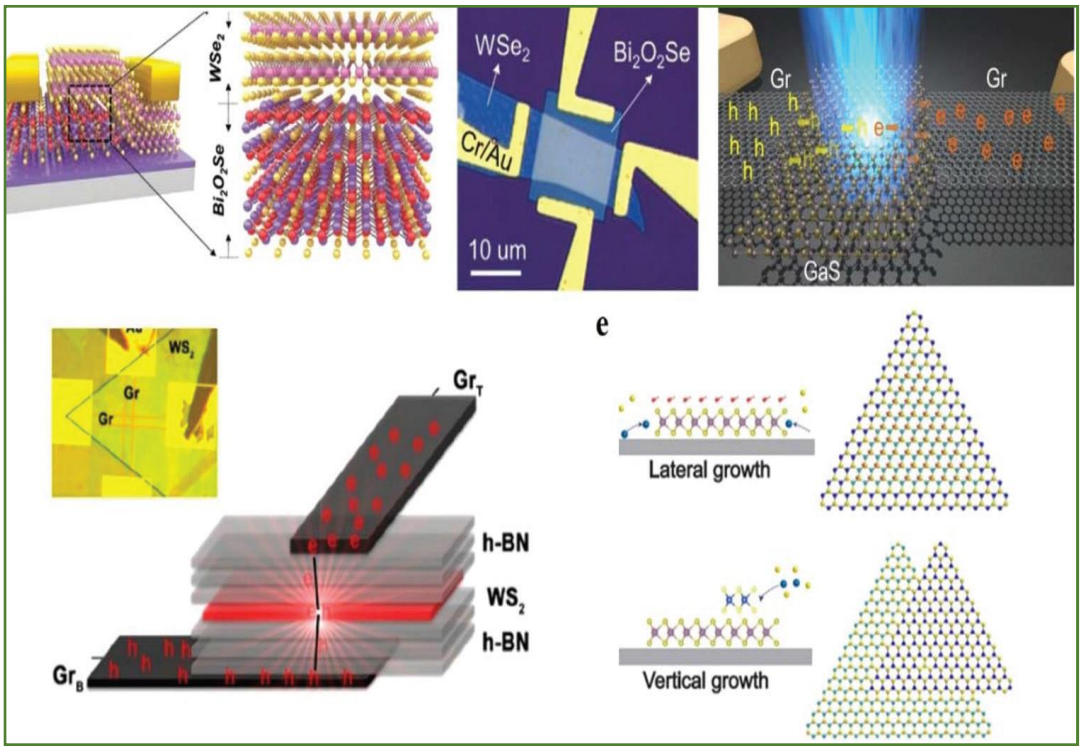
- Energy and Sustainability
- Semiconductors For Future
- Information and Communication Technologies for Future applications
- Smart Flexible Sensors and Devices

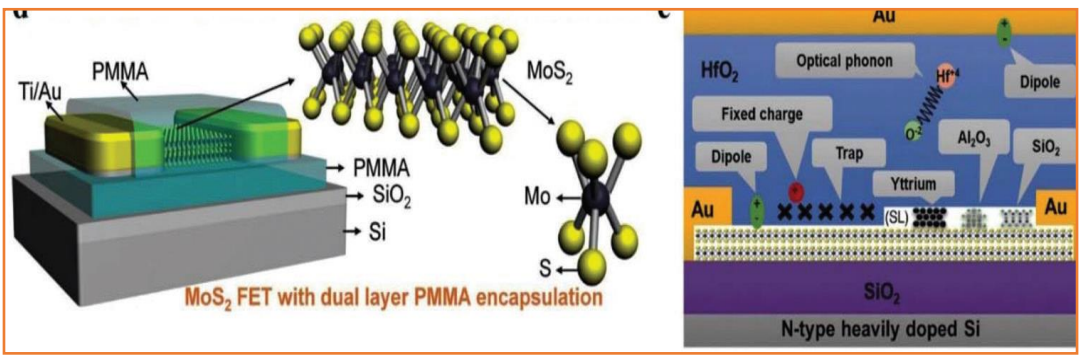


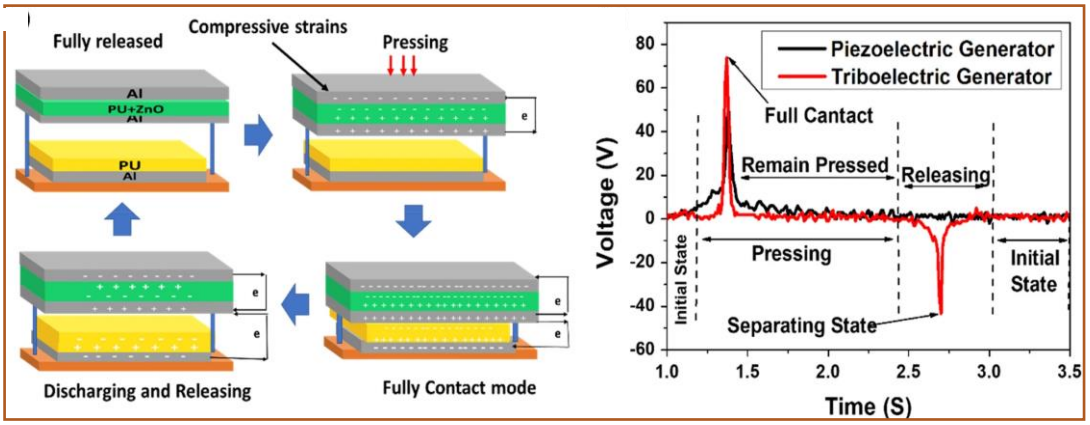
Selected Snapshots from the Research Projects

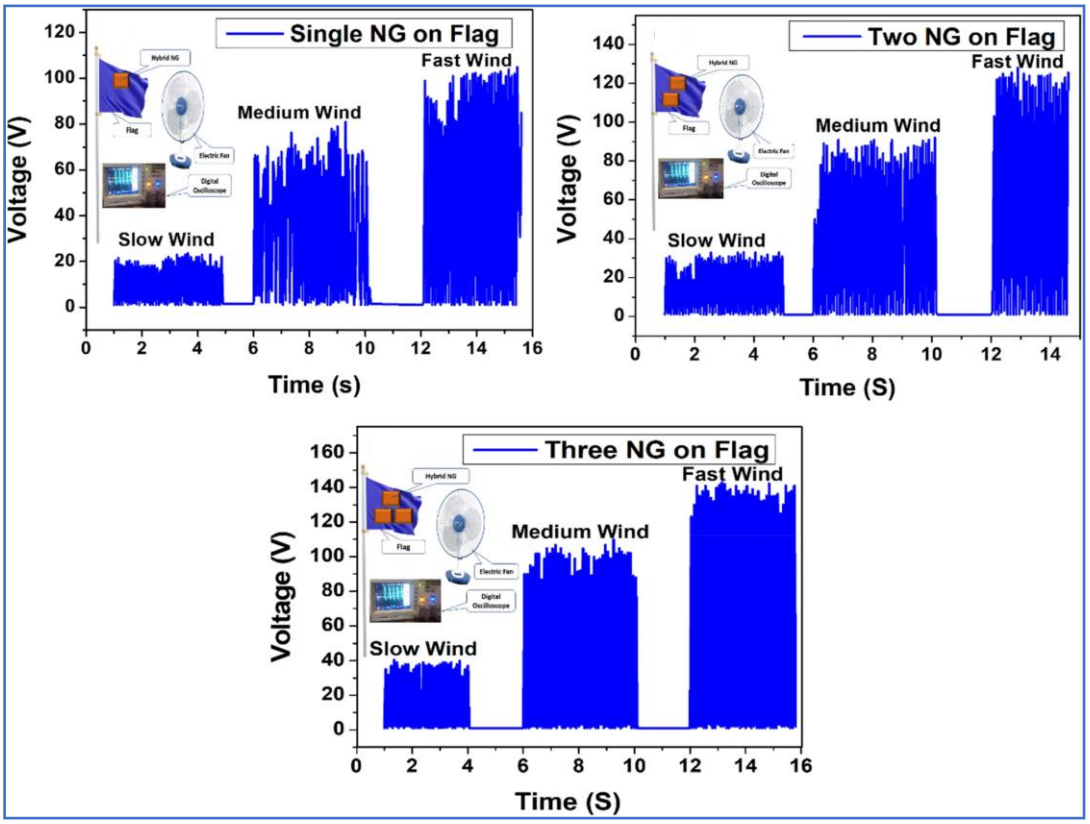


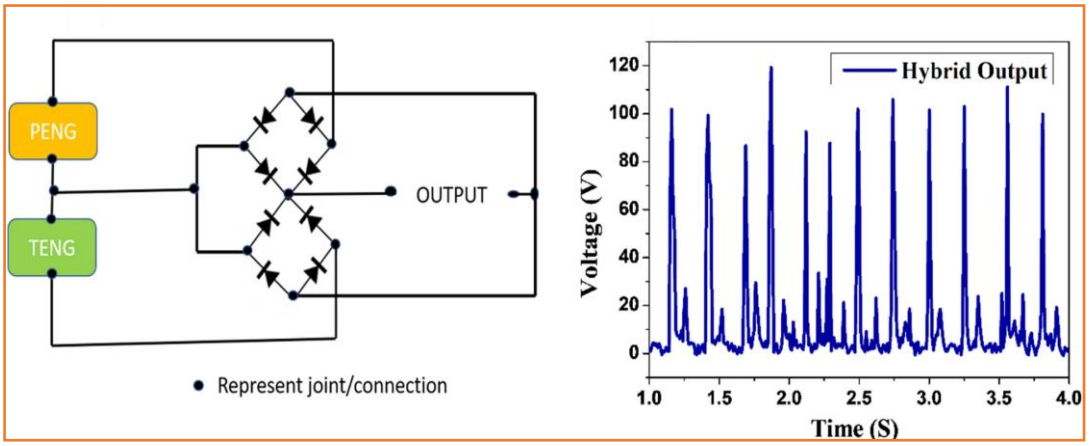

6 MHz gold plated sensing crystal
Position sensing Photodetector
PMMA sated 50nm resolved NEMS actuators
Accelerometer/Pezio-resistive memes stack for Accelerometers
Graphene based MSM structure for UV detection
Silicon based optical detector
Multi-junction magnetic circuit on copper metallized strip
50 nm gold plated bio MEMs structure
Silver grated zinc oxide undoped photodevice for controlled sensing
Organic photocells: sulphated graphene oxide based solar cells
2-D graphene-based Nano- Cmos Capacitor


WSe2
Bi2O2Se
Cr/Au
10 um
Gr
Gr
GaS
WS2
Gr
Gr
GrT
h-BN
WS2
h-BN
GrB
e
Lateral growth
Vertical growth

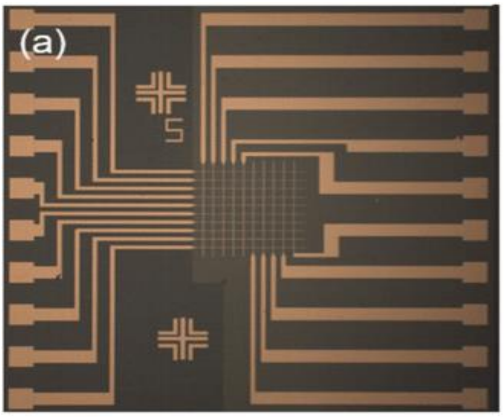

Ti/Au
PMMA
MoS2
PMMA
SiO2
Si
Mo
S
MoS2 FET with dual layer PMMA encapsulation
Au
HfO2
Optical phonon
Hf+4
Dipole
Fixed charge
O-2
Al2O3
SiO2
Dipole
Trap
Yttrium
Au
(SL)
Au
SiO2
N-type heavily doped Si



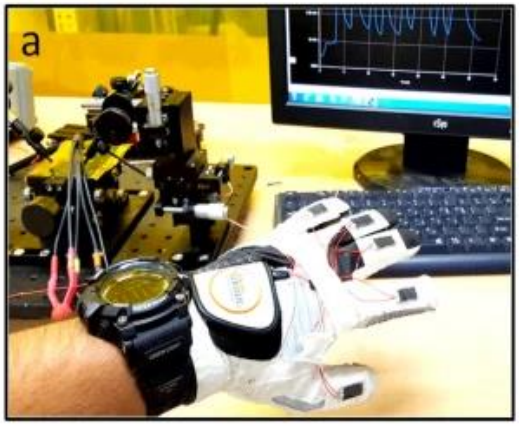




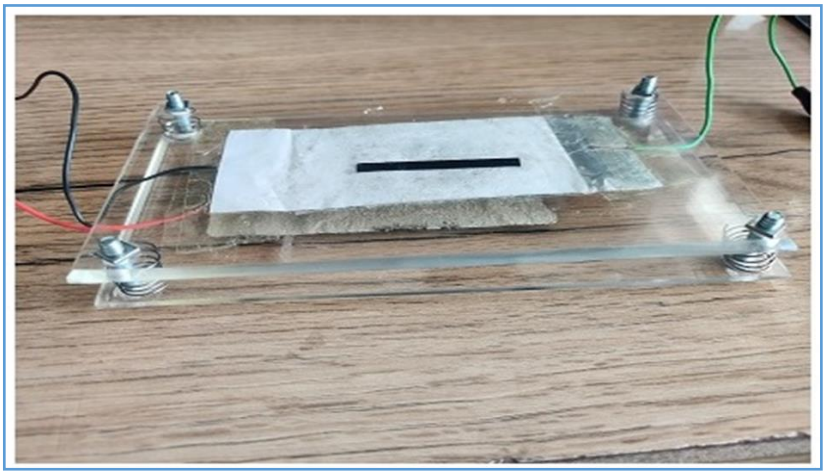
Self-healing Hybrid Nanogenerators. (Published in Journal of Materials Science: Materials in Electronics)

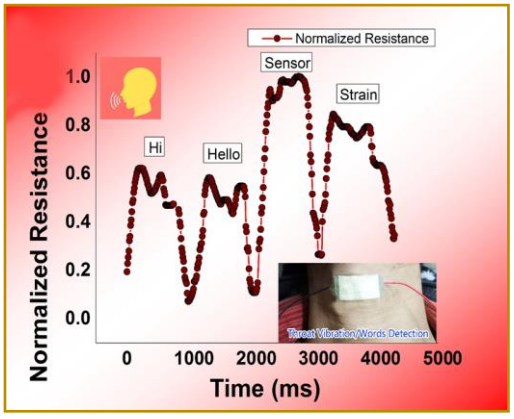


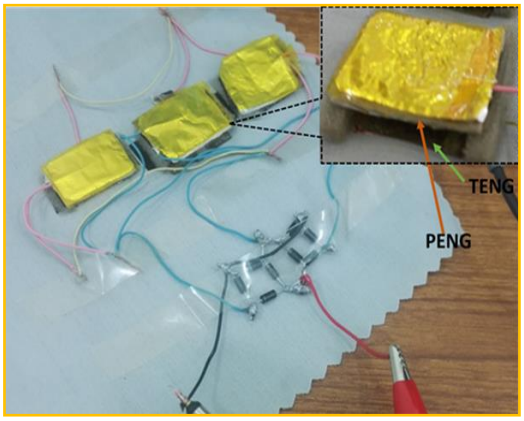
Nanoscale



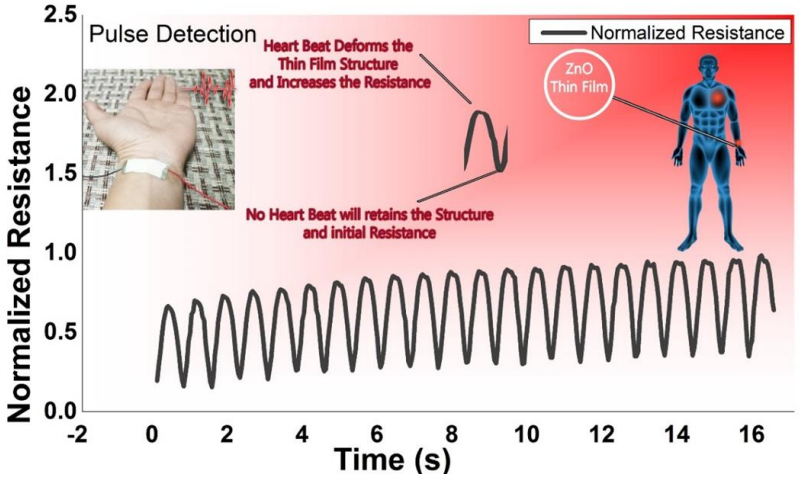
Nature Scientific Reports







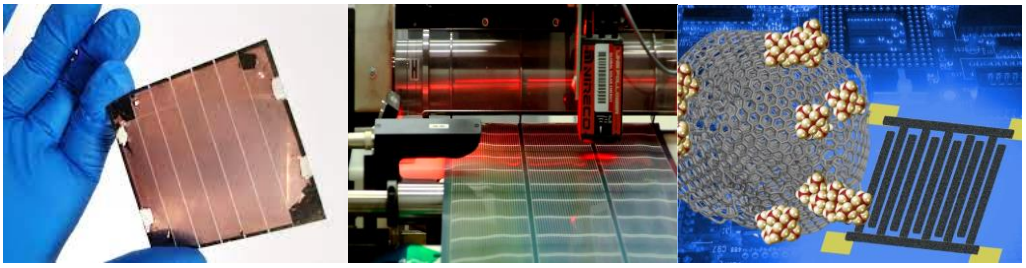
Journal of Materials Science: Materials in Electronics



Energy and Sustainability

- Next-Generation Solar Cells & Power Devices
- Supercapacitors & Nano Harvesters
- Energy Storage Devices

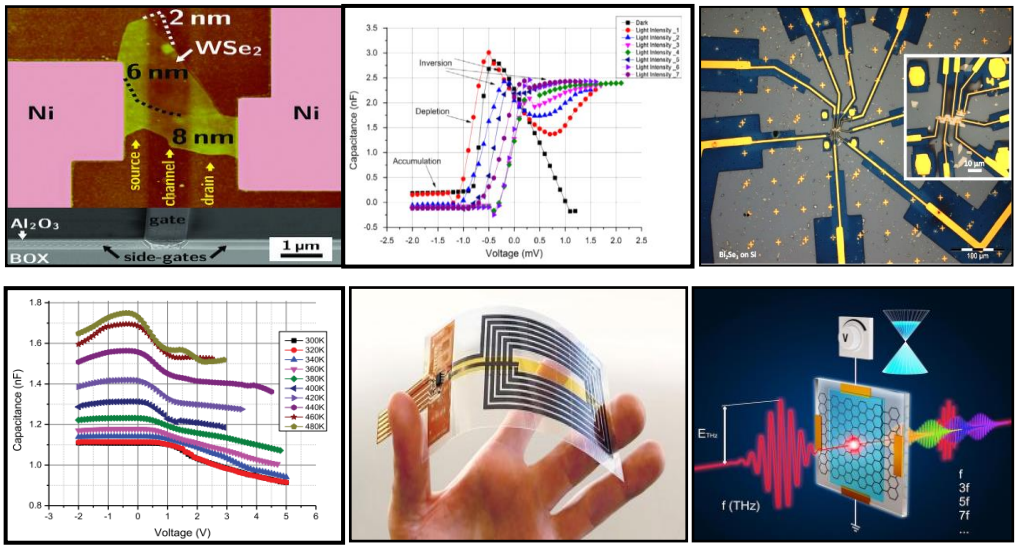
Total No. of Research Projects Conducted so far: 41



Semiconductors For Future

- Energy Efficient Nano Electronics
- Graphene Electronics
- III-V Device Engineering

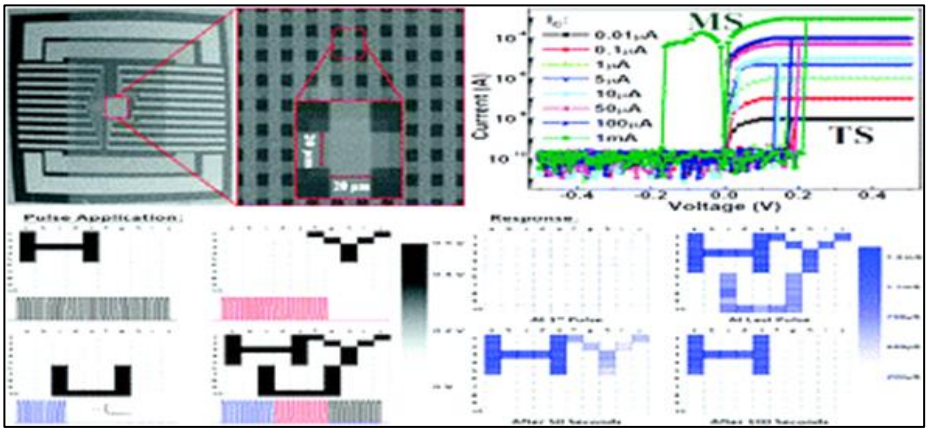
Total No. of Research Projects Conducted so far: 34



Information and Communication Technologies for Future applications

- Photonics
- Sensing & Detection
- Future Devices, Circuits & Systems

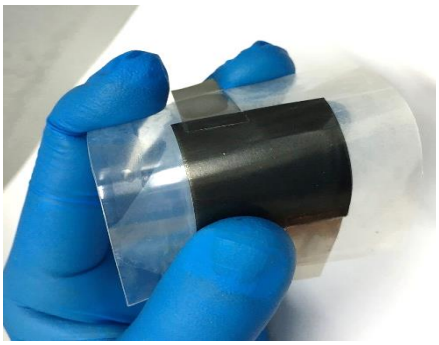
Total No. of Research Projects Conducted so far: 35

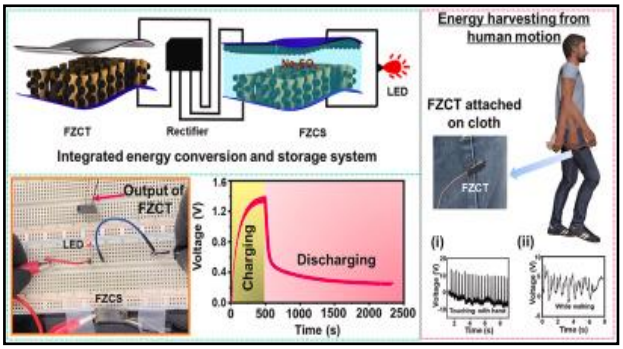


Smart Flexible Sensors and Devices

- Sensors
- Smart Devices

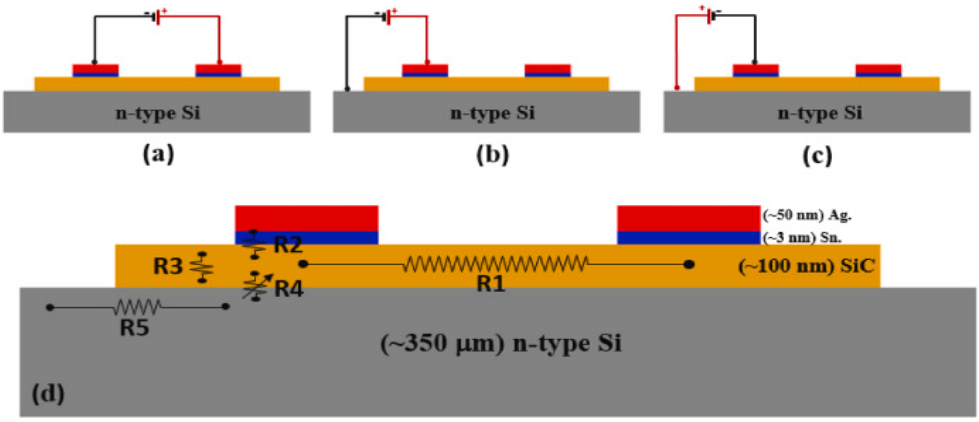
Total No. of Research Projects Conducted so far: 25



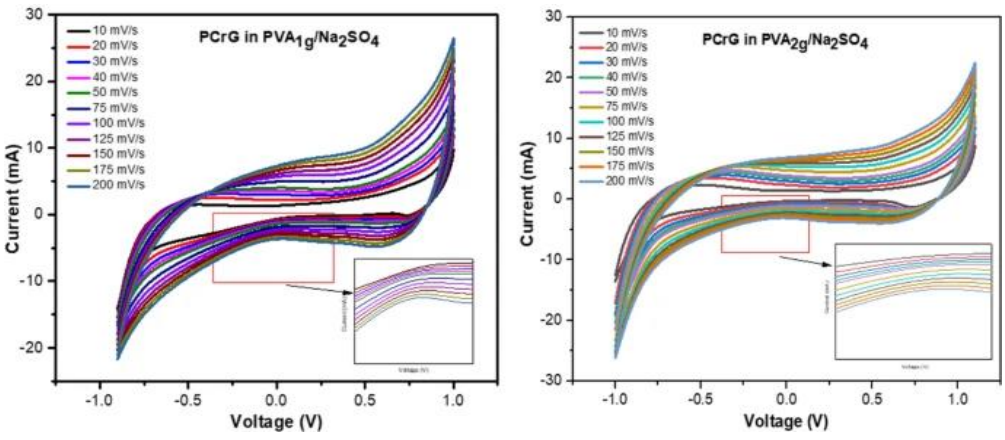


Selected Publications

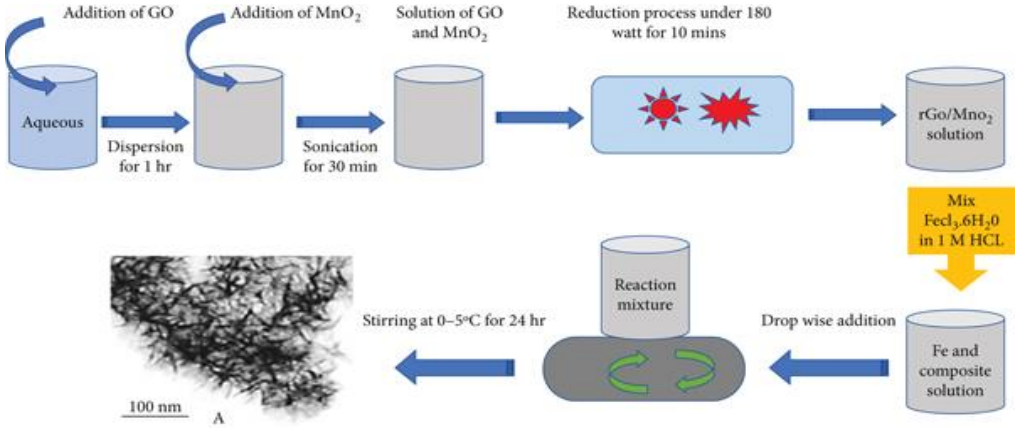
- Fabrication and characterization of SiC-based transparent passivating contacts for enhanced photovoltaic performance, Optical Materials,144, (2023).



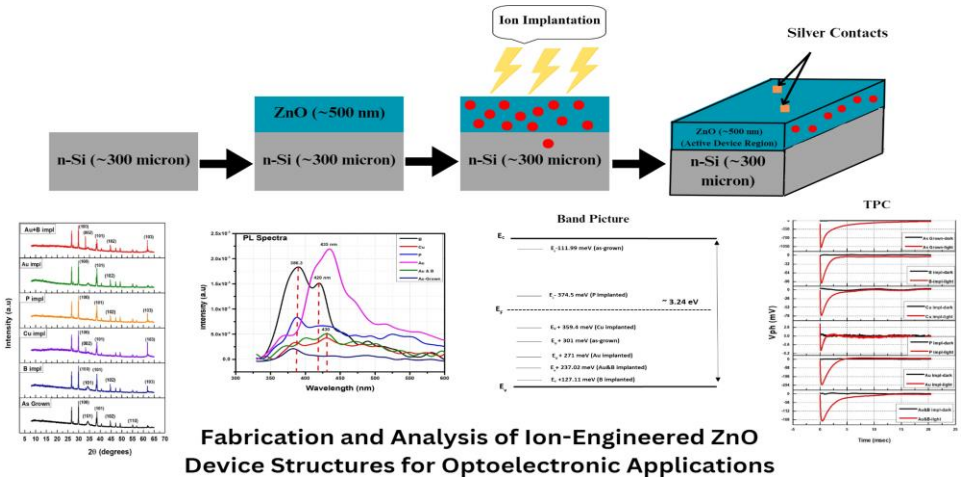
- Exploring the Synergistic Effect of a PANI/Cr2O3/Graphene Nanocomposite in a Hybrid Gel Electrolyte for Supercapacitor Performance, Journal of Electronic Materials, 1-14, 2023.



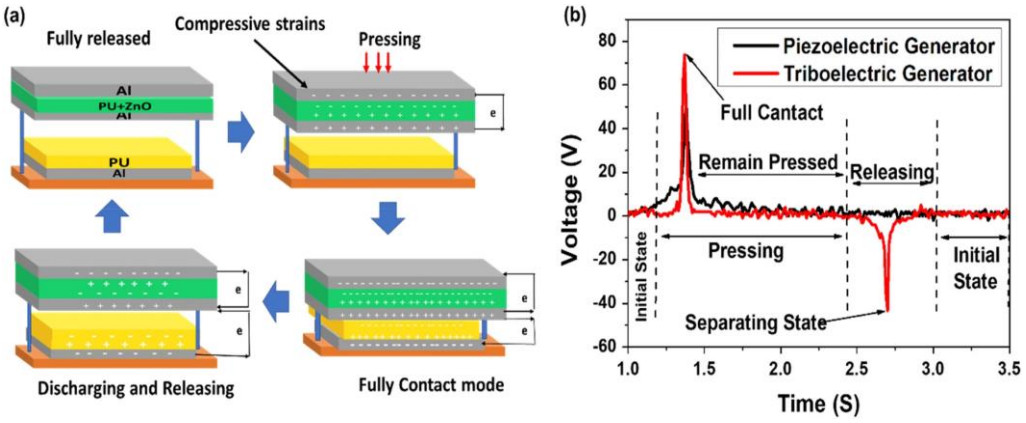
- Unveiling the electrochemical advantages of a scalable and novel aniline-derived polybenzoxazole-reduced graphene oxide composite decorated with manganese oxide nanoparticles for supercapacitor applications, Journal of Energy Storage, 73, Part C, 109109, 2023



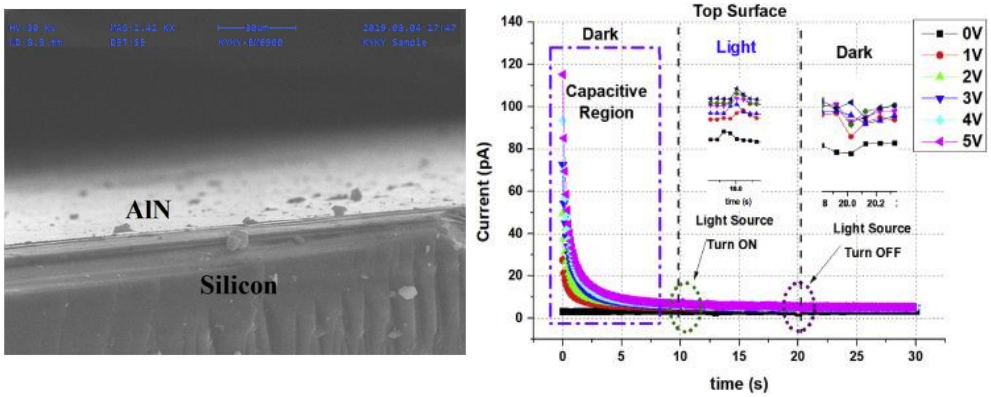
❖ Fabrication and Analysis of Ion-Engineered ZnO Device Structures for Optoelectronic Applications," IEEE Photonics Journal. 15, 5, 1-14, Oct. (2023).



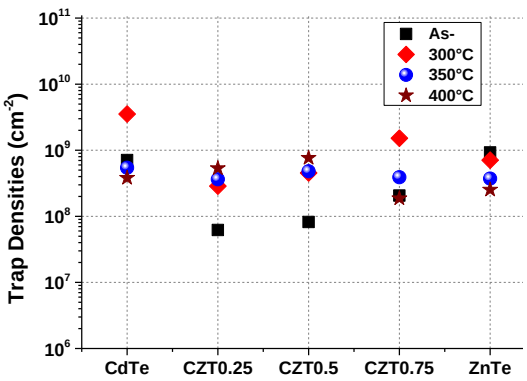
❖ Fabrication of self-healing hybrid nanogenerators based on polyurethane and ZnO for harvesting wind energy, J Mater Sci: Mater Electron, 33, 3982–3993(2022).

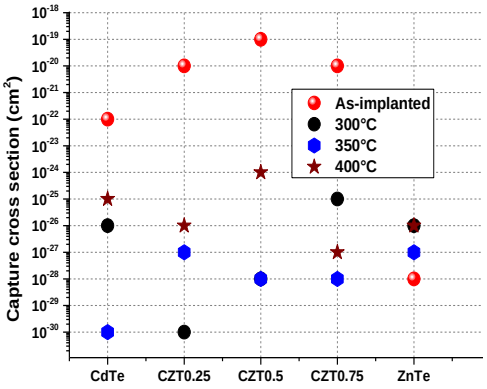


❖ Advanced electrical characterization of AlN/Si based heterogeneous junction for photonic applications. Materials Science in Semiconductor Processing, 138, 106292, (2022).

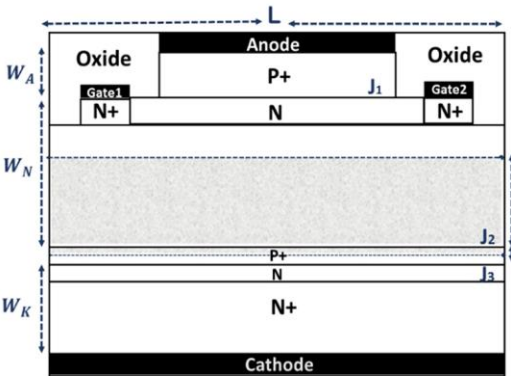


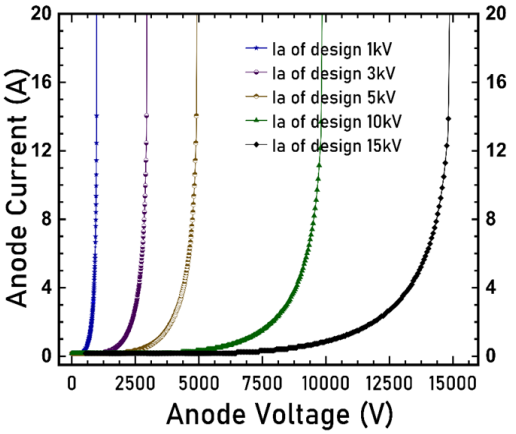
❖ Effect of Annealing Dynamics on the Ion-Engineered ZnTe/CdTe Solar Cells, Journal of Material Science: Materials in Electronics, **32,** 22143–22154 (2022).



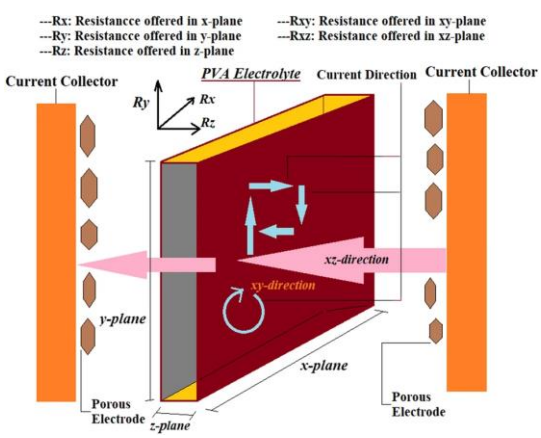


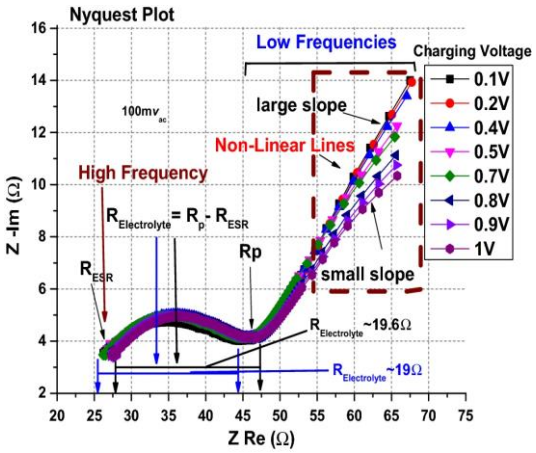
❖ Modelling and Simulation of Design Variants for the Development of 4H-SiC Thyristors. Silicon. (2022):



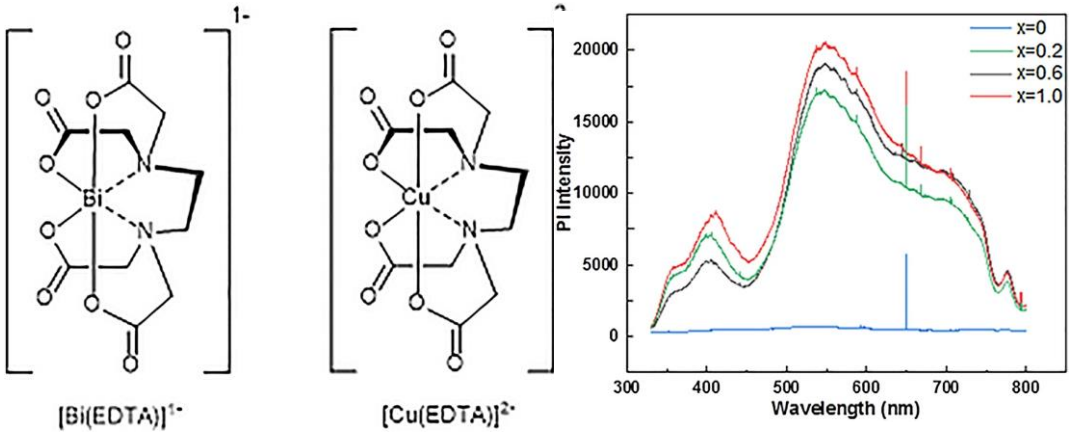


❖ Investigation of Charge and Current Dynamics in PVA-KOH Gel Electrolyte Based Supercapacitor, Journal of Materials Science: Materials in Electronics, 33, 2322–2335 (2022).

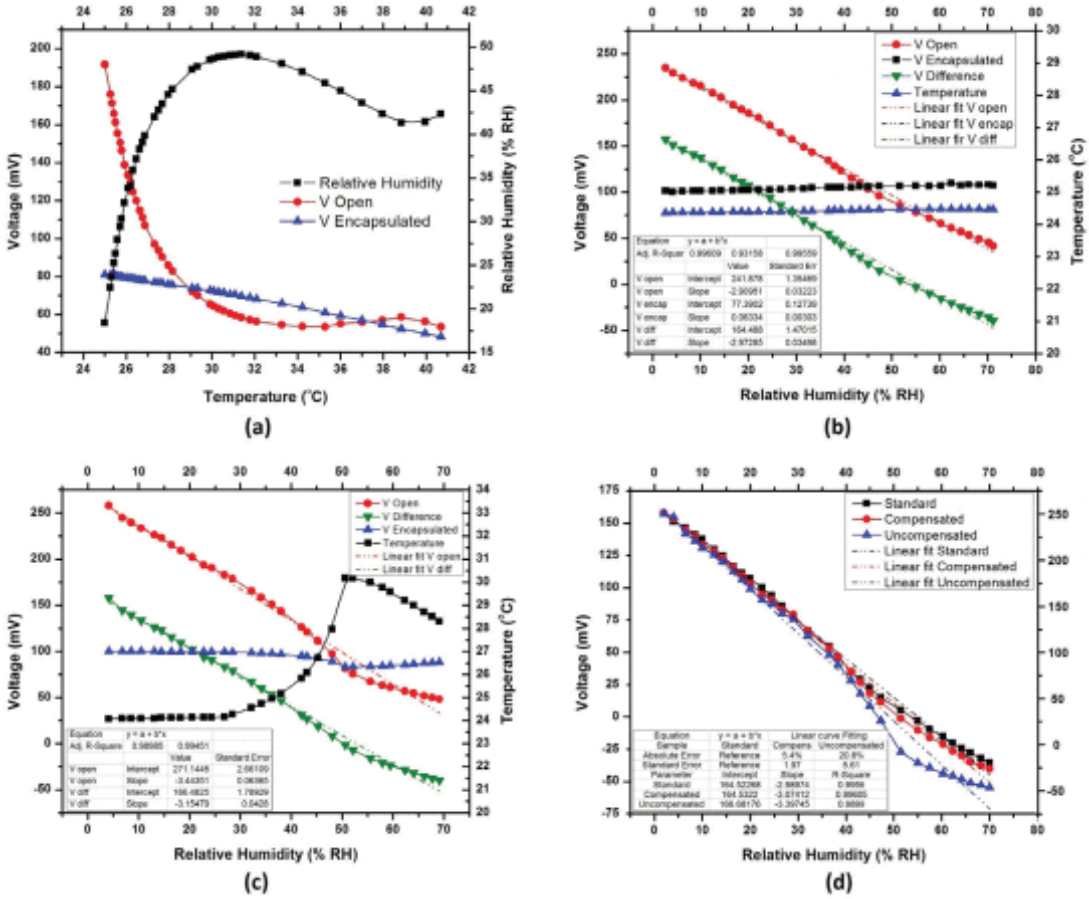




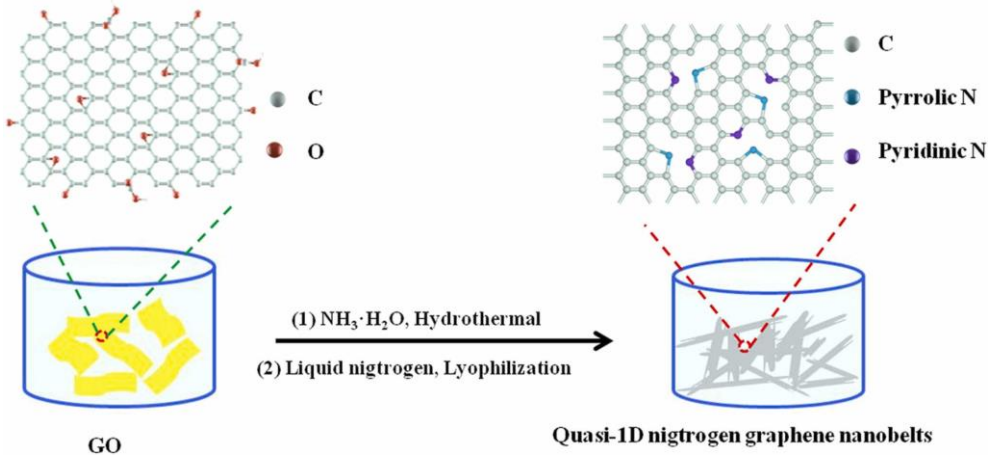
❖ Optoelectronic Analysis of Bismuth Sulfide and Copper-Doped Bismuth Sulfide Thin Films. JOM 74, 2809–2816 (2022)



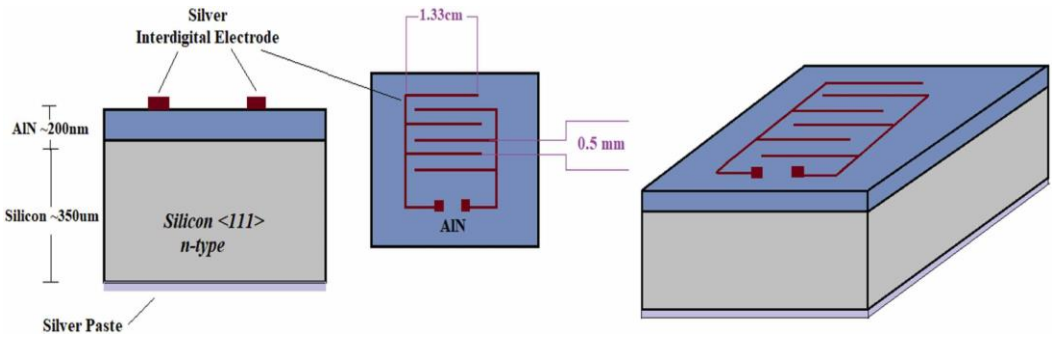
❖ Progress and future of relative humidity sensors: a review from materials perspective. Bull Mater Sci 45, 238 (2022).



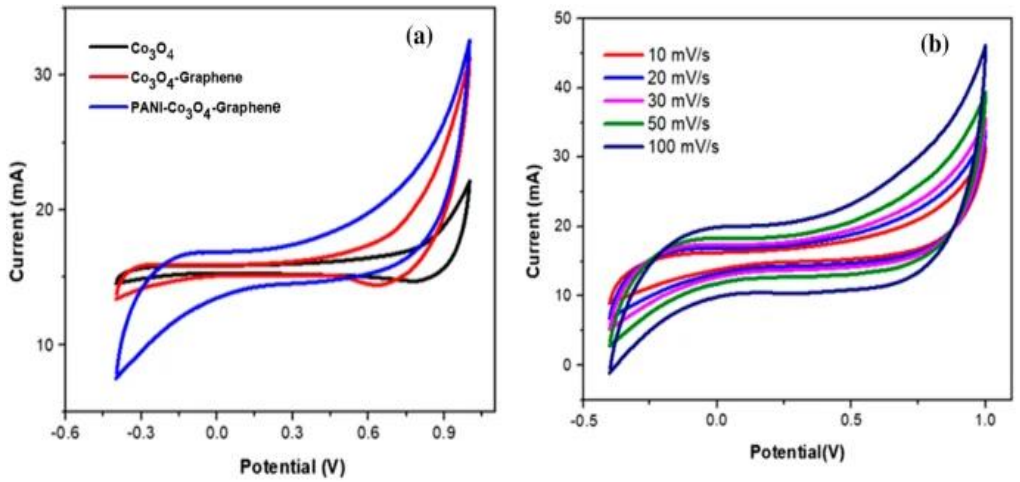
❖ Controlled synthesis of the state-of-the-art quasi one-dimensional graphene nanostructure for high performance supercapacitor, Synthetic Metals, 289, 117131, 2022.



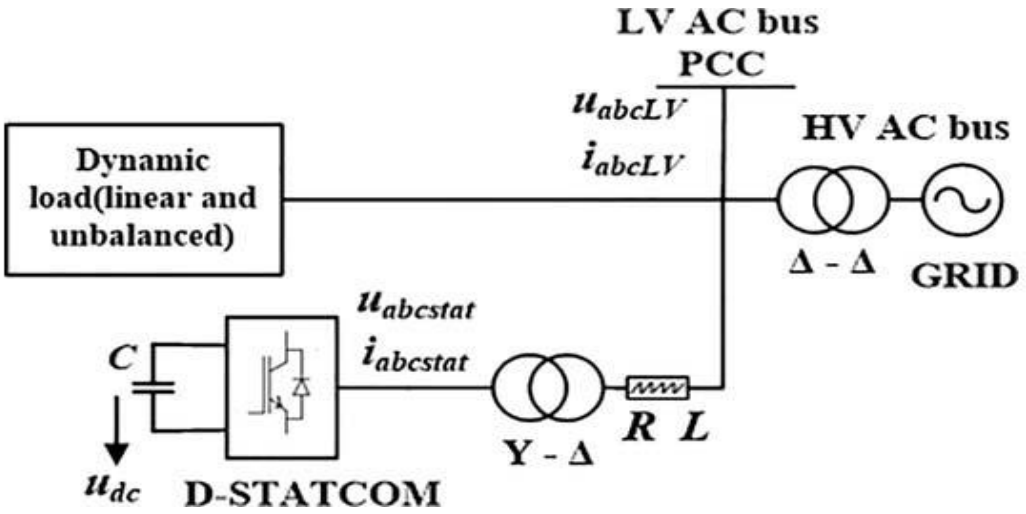
❖ Investigation of AlN/Si based heterogeneous Junction using inter-digitated electrodes for enhanced UV light detection, Optik, 265, 169534, 2022.



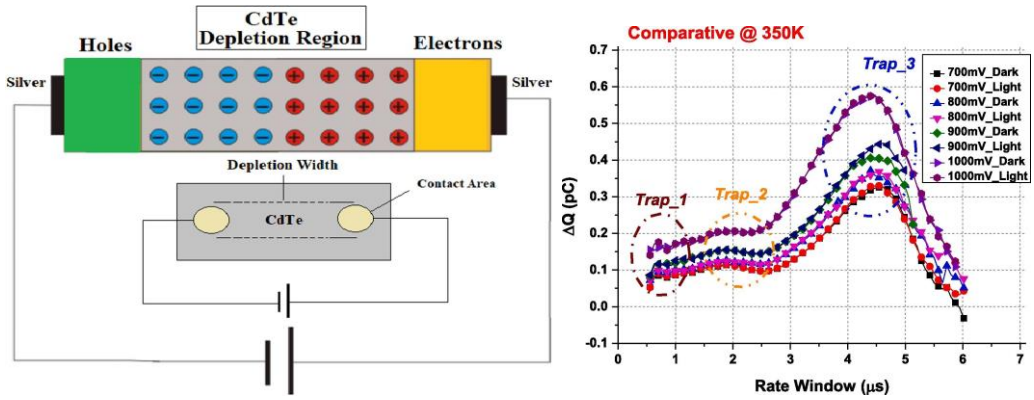
❖ Enhanced Energy Density of PANI/Co3O4/Graphene Ternary Nanocomposite in a Neutral Aqueous Electrolyte of Na2SO4 for Supercapacitor Applications, Journal of Electronic Materials, 51 (9), 5417-5428, 2022.



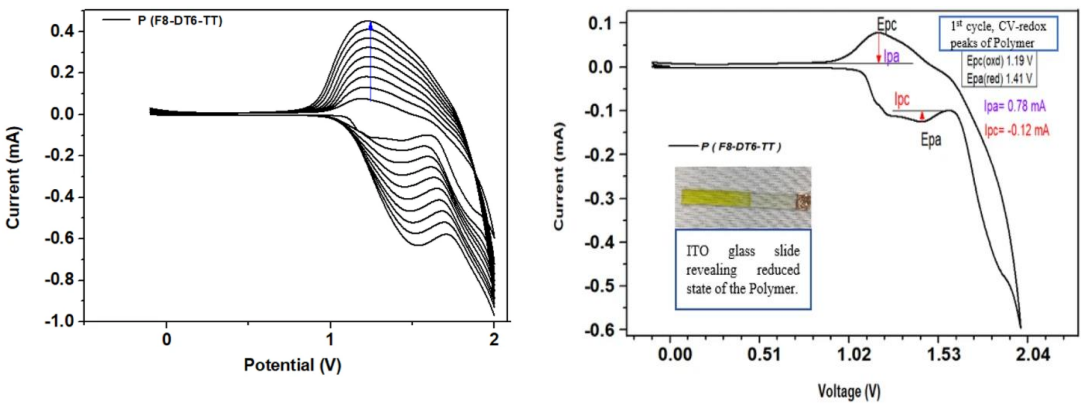
❖ Analysis of Fractional Order Sliding Mode Control in a D-STATCOM Integrated Pow-er Distribution system, IEEE Access, 9, 70337-70352, (2021).



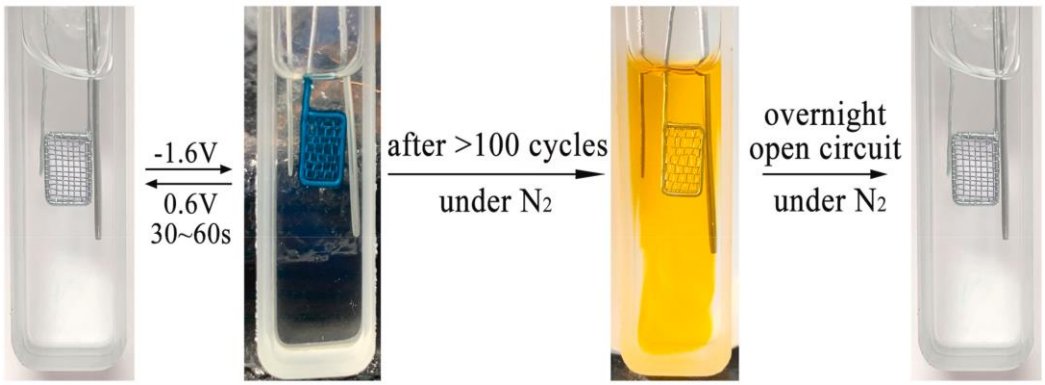
❖ Defect mapping of active layer of CdTe solar cells using charge deep level transient spectroscopy (Q-DLTS), Engineering Failure Analysis, 119, 104991, (2021).



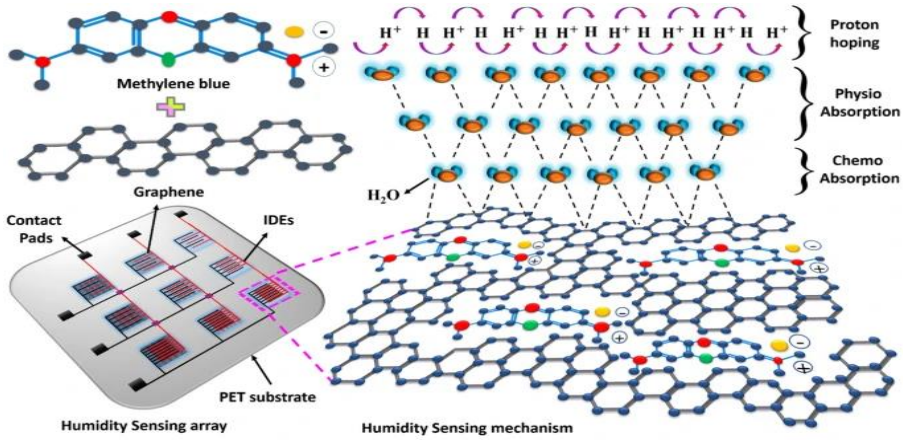
❖ Fluorene substituted thieno [3, 2-b] thiophene–a new electrochromic conjugated polymer. Journal of Polymer Research, 28, 397, (2021).



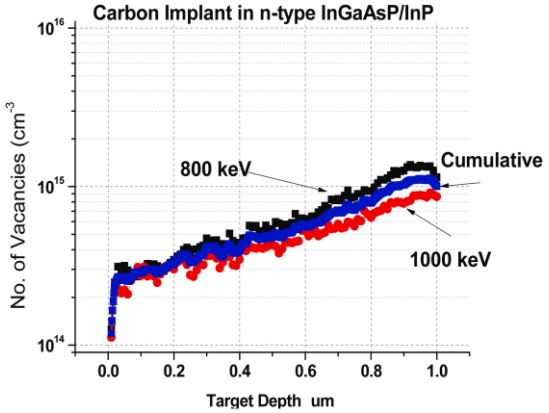
- Thiophene-2, 5-diesters as electrochromic materials: The effect of ester groups on the device performance and stability. Organic Electronics, 96, 106188 (2021).

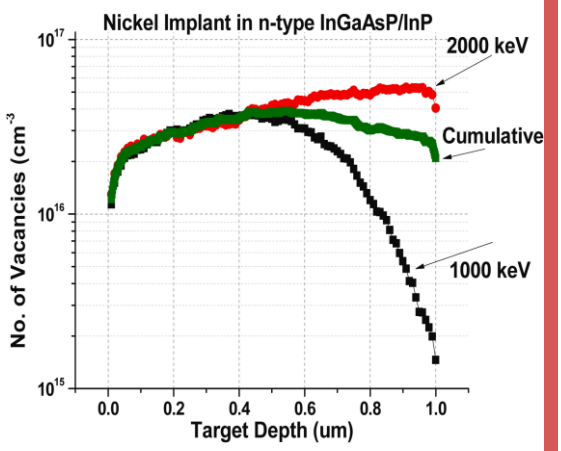


- Wide range and highly linear signal processed systematic humidity sensor array using Methylene Blue and Graphene composite, Nature Scientific Reports, 11, 16665 (2021).

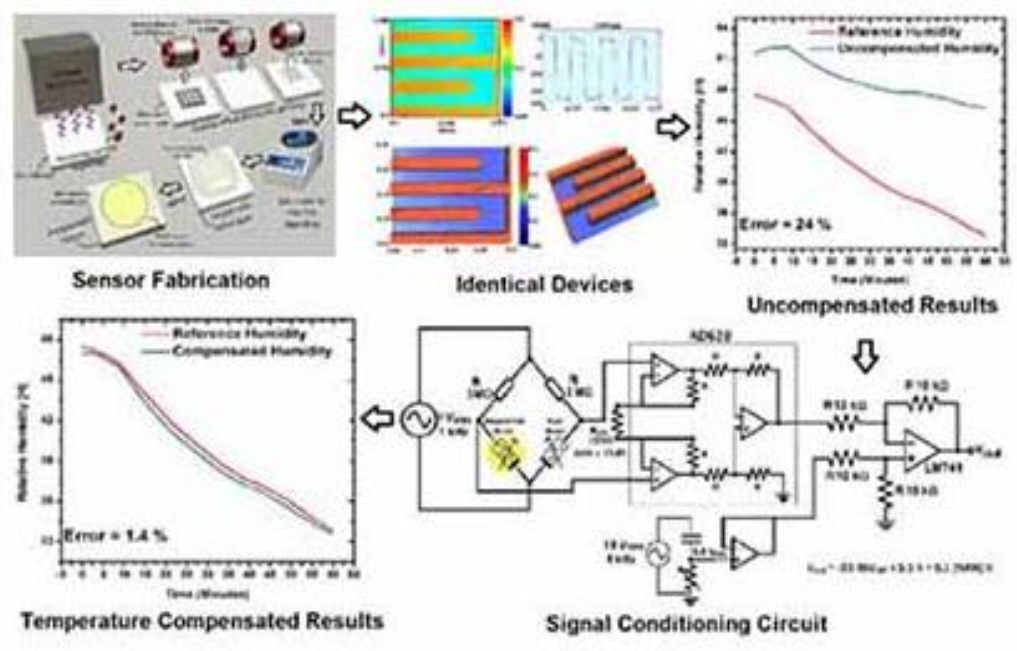


- Carrier removal and transport in photonic integrated circuit ready InGaAsP/InP substrate: Electrical and transients of charges evaluation, Materials Science in Semiconductor Processing, 121, 105384, (2021).

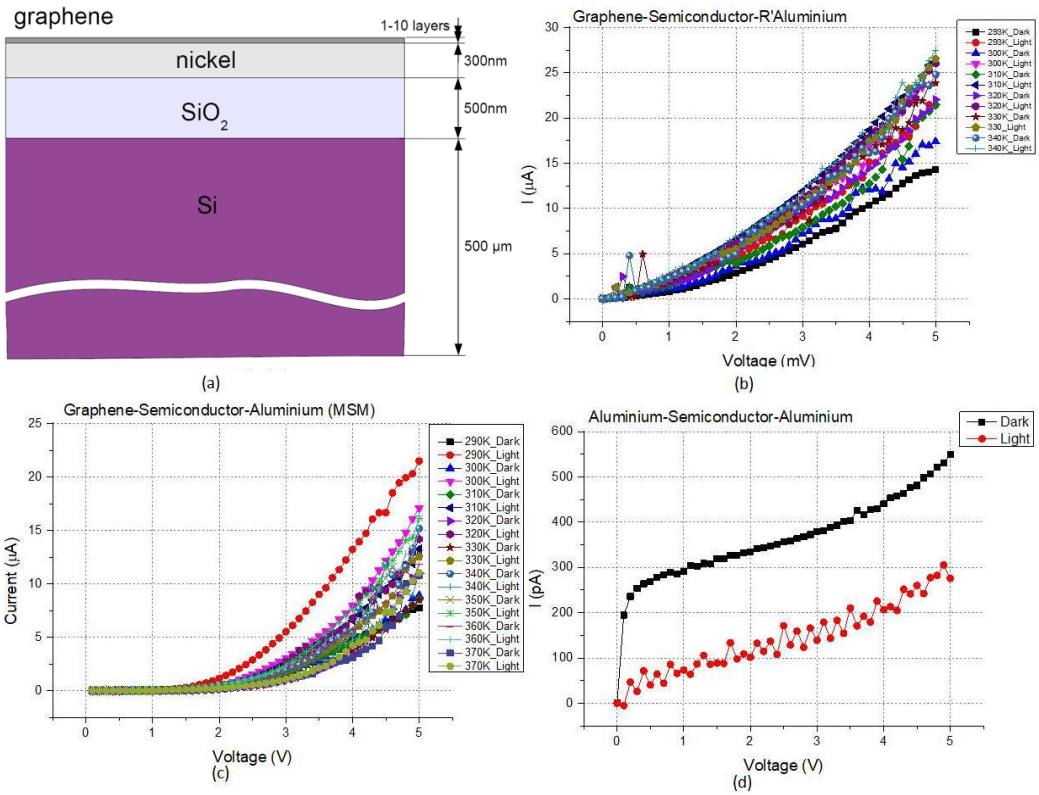




- Facile and low cost temperature compensated humidity sensor and signal conditioning system, IEEE Sensors Journal, 21, 13, 14906-14914 (2021).

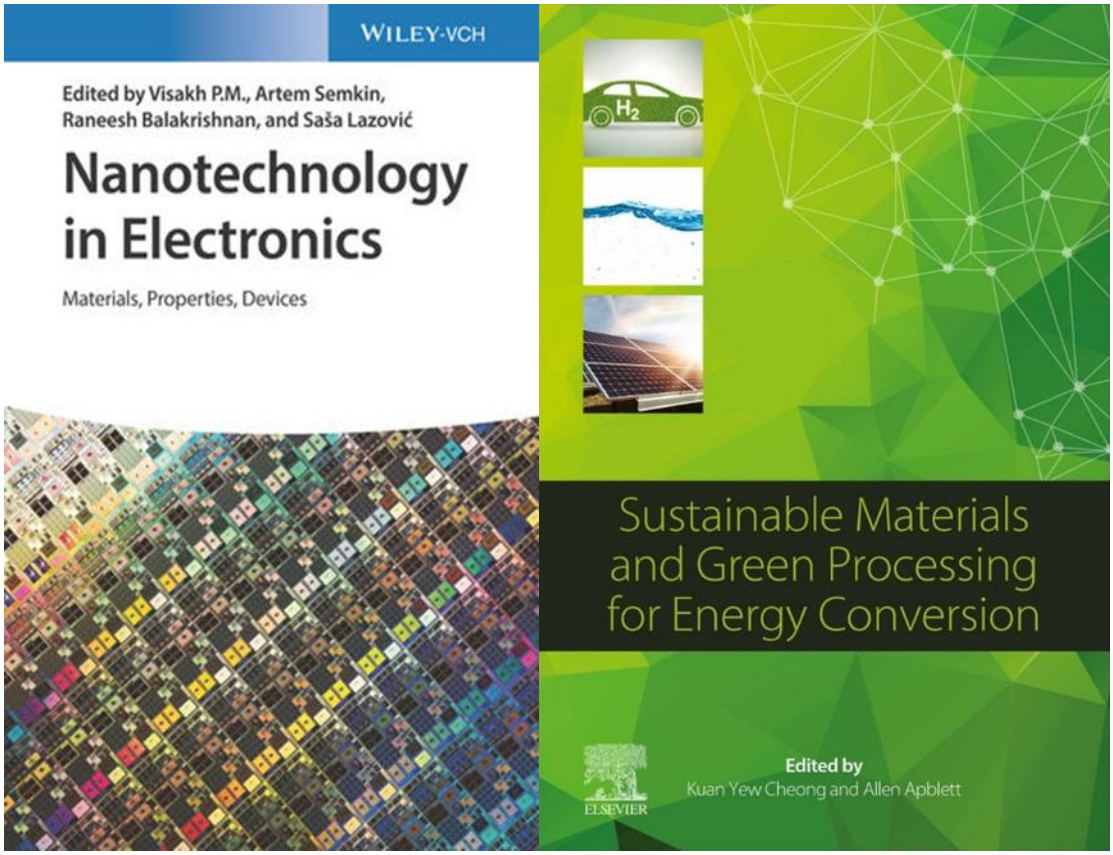


- Fabrication and characterization of graphene induced Metal Semiconductor Metal (MSM) structure for detection and sensing applications, European Physical Journal-Applied Physics, 93, 10503, (2021).



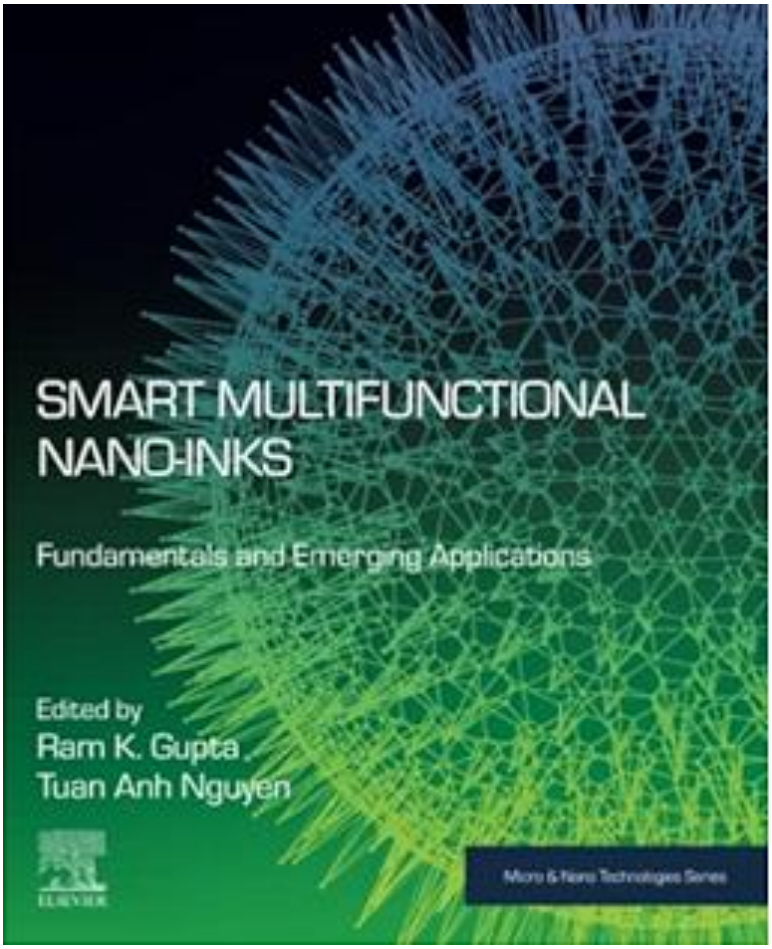
Book Chapters

1. **Graphene-based Nanoelectronic Biosensors, in Nanotechnology in Electronics: Materials, Properties, Devices, 25-61 (ISBN:9783527346738, 2023) [Book Chapter: Wiley-VCH GmbH]**
2. **Smart polymeric nanocomposites: synthesis and applications, in Smart Polymer Nanocomposites, 61-91 (ISBN: 978-0-323-91611-0, 2023) [Book Chapter: Elsevier Inc.]**
3. **Smart electronic textiles, in Smart Polymer Nanocomposites, 395-412 (ISBN: 978-0-323-91611-0, 2023) [Book Chapter: Elsevier Inc.]**
4. **Nano-inks and their applications in packaging industries, in Smart Multifunctional Nano-inks, 687(ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**
5. **MXenes for energy applications, in Smart Multifunctional Nano-inks, 475 (ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**



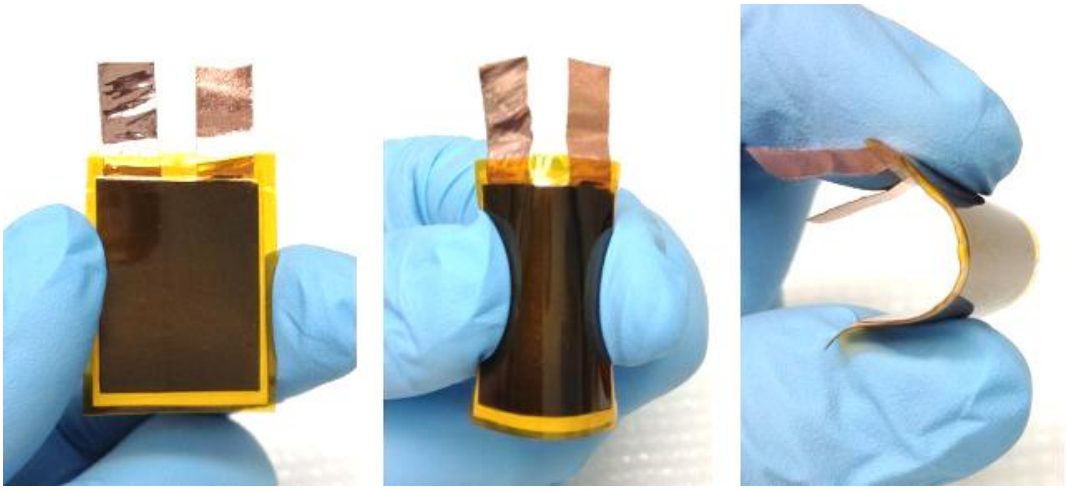
Book Chapters

6. **Smart multifunctional polymeric inks for supercapacitor applications, in Smart Multifunctional Nano-inks, 429 (ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**
7. **Smart nanomaterials and three-dimensional printing for flexible solar cell applications, in Smart Multifunctional Nano-inks, 389 (ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**
8. **Electronic applications of carbon nano-dots, in Smart Multifunctional Nano-inks, 227 (ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**
9. **Introduction to smart multifunctional metal nano-inks, in Smart Multifunctional Nano-inks, 1 (ISBN: 978-0-323-91145-0, 2023) [Book Chapter: Elsevier Inc.]**
10. **Flexible single-source precursors for solar light-harvesting applications. In Sustainable Materials and Green Processing for Energy Conversion, 279-304, 2022. [Book Chapter]**

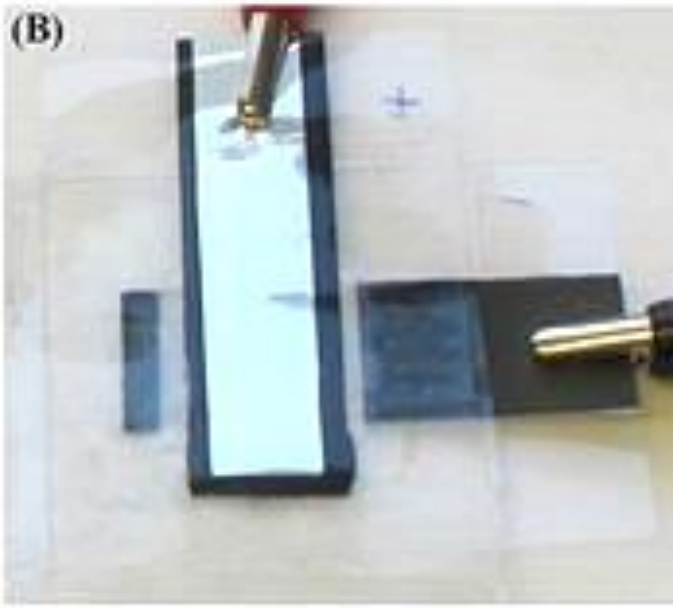


PATENT FILED from 2021 to Date (IIU, PAKISTAN)

- Methods of producing novel thiophene-2, 5-diester supercapacitive electrochromic materials for energy storage applications **(Patent Application # 437/2021)**

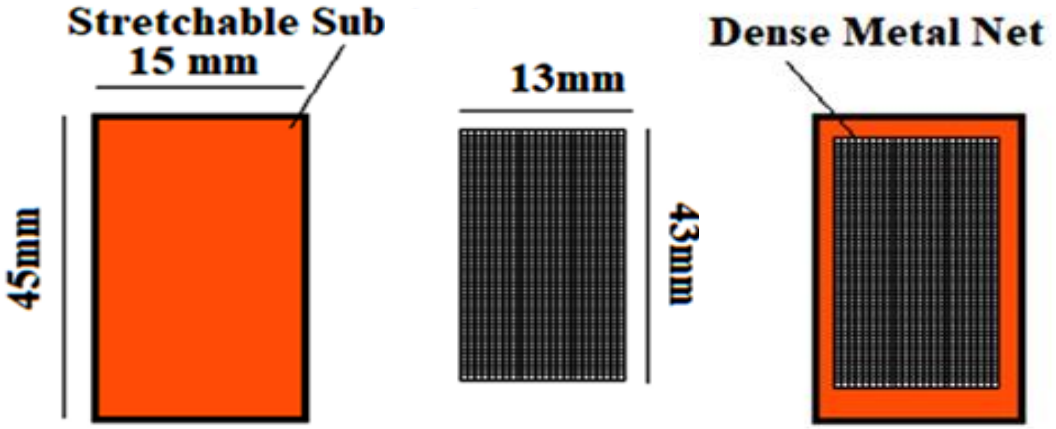


- Novel thienothiophene polymer and its synthesis method for electrochromic and flexible supercapacitor applications **(Patent Application # 563/2021)**

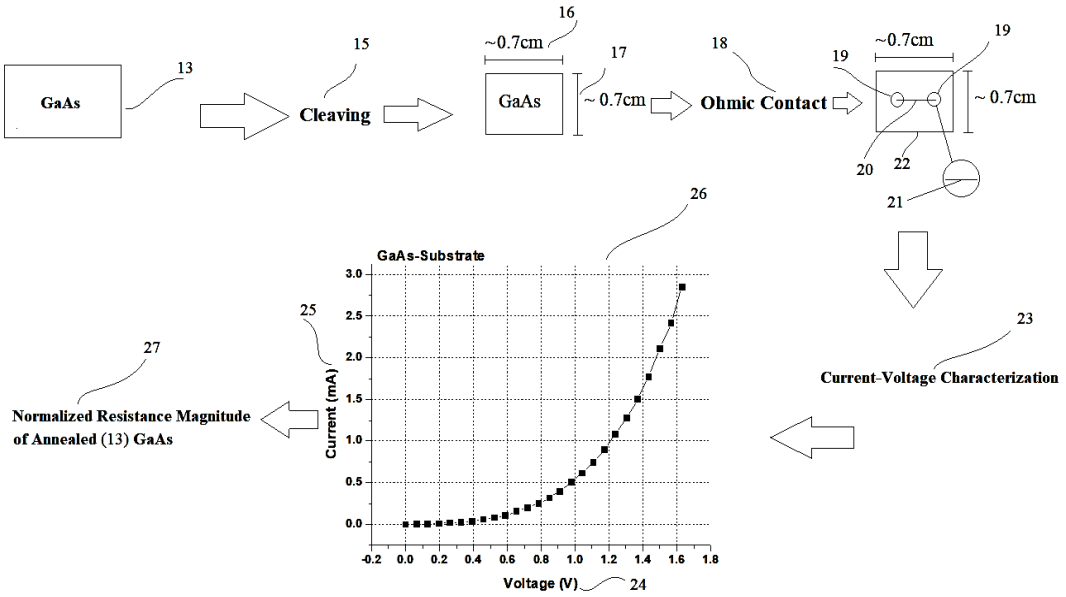


(Disclaimer: Inventions covered under Intellectual Property Rights)

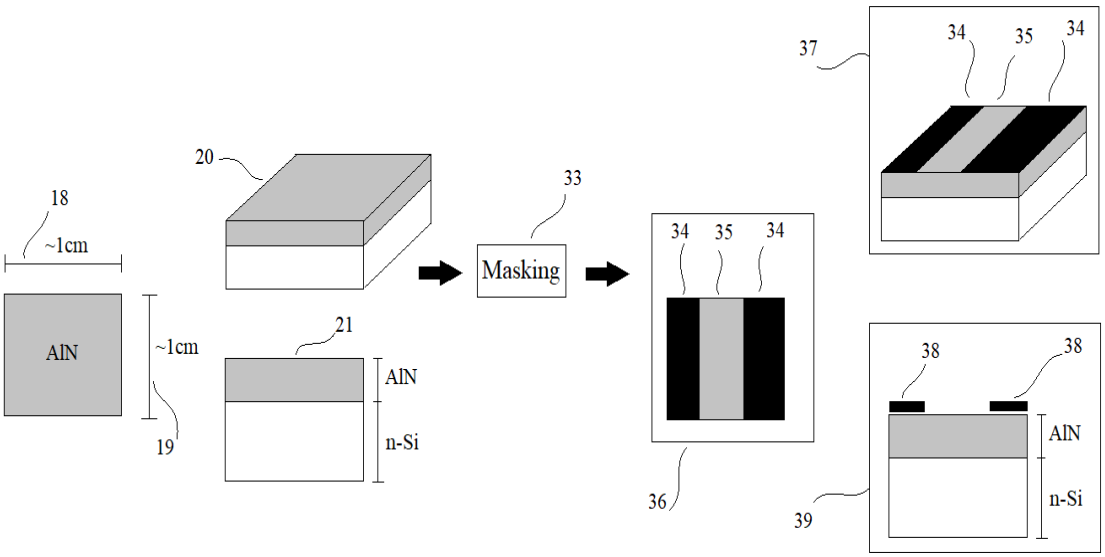
- A novel method for the performance evaluation of stretchable and foldable supercapacitor for energy storage application **(Patent Application# 846/2021)**

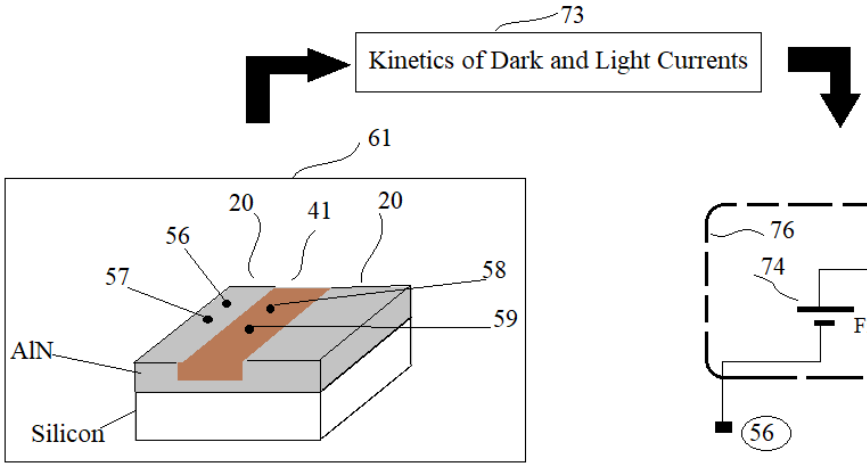


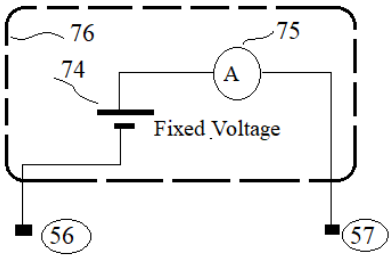
- An Electrical Isolation induced novel method for the fabrication of GaAs and InP based Photo Detectors **(Patent Application# 845/2021)**

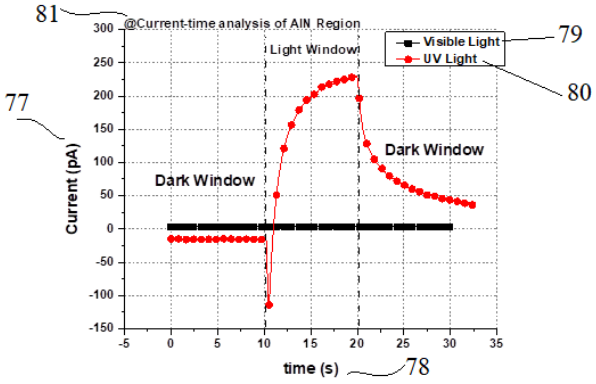


- A Method to Sense the Low Energy Photons from Aluminum Nitride (AlN) Wide Bandgap Semiconductor for Photo-detection Applications **(Patent Application # 413/2022)**









Selected Grants

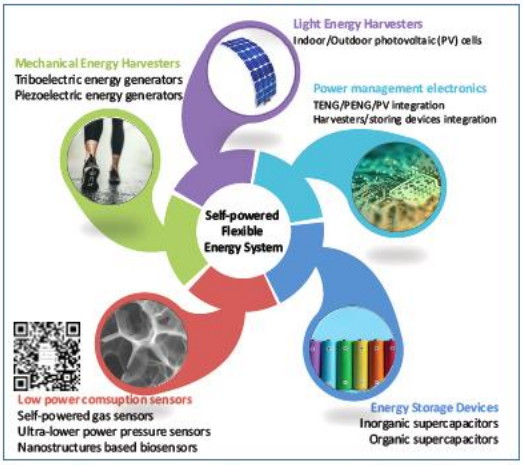
BRITISH COUNCIL | UNIVERSITY OF THE WEST of SCOTLAND UWS | PAK UK Education Gateway HEC/British Council Innovative & Collaborative Research Grants | INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD | HEC

FleEnSys

Investigation in Advanced Energy Harvesters and Energy Storage Devices for Self-powered Flexible Energy System

Grantee: Dr. Imran Murtaza (International Islamic University, Islamabad)
Co-Grantee: Prof. Dr. Ahmed Shuja Syed (International Islamic University, Islamabad)
PI from UK: Dr. Carlos Garcia Nuñez (University of the West of Scotland)
Project Budget: PKR 100 million; Commencement date: 28th June, 2021
HEC Grant No: 20-ICRG-165/RGM/HEC/2020

Overview

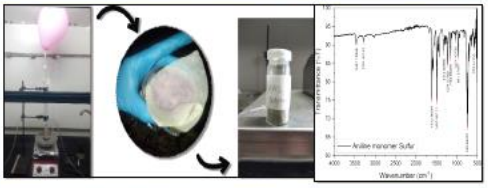


Objectives

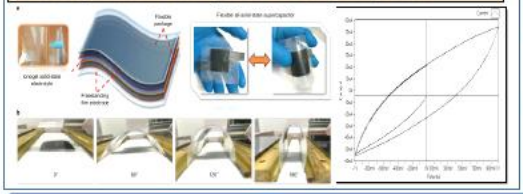
1. Synthesis & characterization of flexible materials: polymers & 2D structures
2. Fabrication of polymer & Graphene/MXene flexible supercapacitors (**SCs**)
3. Fabrication of flexible triboelectric & piezoelectric energy generators and PV cells.
4. Fabrication of SPAES based on SCs and energy harvesting devices.
5. Encapsulation & testing of optimized devices through FleEnSys industrial partner.
6. Validation, prototyping and up-scaling of self-powered electronics & sensing platforms

Research Outputs of IIUI

1. Synthesis and characterization of Polyaniline monomers

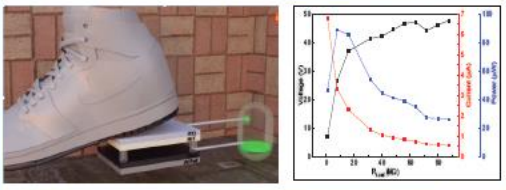


2. Development and testing of flexible Supercapacitors

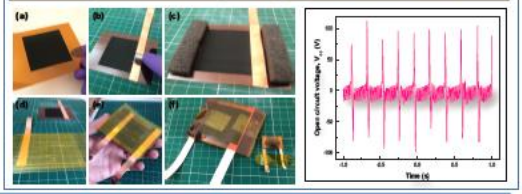


Research Outputs of UWS

1. Development and testing metal oxide based TENG



2. Development and testing of 3D graphene based TENG



Way Forward/Outcomes

Testing and validation of TEG, PV and SC devices based on newly designed and synthesized materials

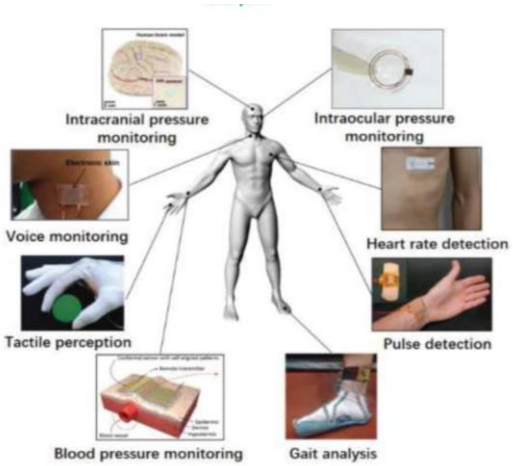
Confirmation of continuous powering based on TEG+PV SPAES

Confirmation of SPAES as valid energy source for wearable tech

USME | TFSI Institute of Thin Films, Sensors and Imaging | University of Glasgow | meLAB | lightricity | NIZAM ENERGY | UAM Universidad Autónoma de Madrid

NATIONAL RESEARCH PROGRAM FOR UNIVERSITIES (NRPU)

Towards Wearable Electronic World: Smart Self-Healing Flexible and Ultra-Stretchable Strain Sensors and Devices for Medical Applications.



Objectives

- Development of rational methodologies to **synthesize solution processed** self-healing Materials.
- Development of rational methodologies to control the formation of **functionalized self-healing materials** (doping, capping) under mild conditions.
- Identification of mechanisms/understanding and tailoring the specific interactions of solution processed **self-healing materials**.
- Nano composite films with induced self-healing properties.
- Preparation of UV curable polyurethane substrate for self-healing devices (Flexible sensors)
- Applications of solution processed self-healing materials in smart sensing (Strain sensors) like **human motion detection, health care, damage detection, characterization of structures, exhaustion studies of materials**, smart devices and many more.
- **Opens a new way to next-generation printed and flexible smart electronic technologies** and customized applications in **Pakistan.**
- **Indigenous Property creation for possible exploitation of the market demand in Pakistan.**

Project Budget: 9.56 Millions

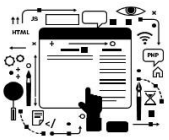
Introduction

Real breakthroughs in the design and processing of **solution processed self-healing materials** that would have far reaching consequences for the future **smart self-healing flexible and ultra-stretchable sensors** and its applications for **customized targets and biomedical usage**. Micro cracks and mechanical fractures in the strain sensors are very easily occurred under frequent deformation. The performance of the sensors are liable to the structure damage, which cause the loss of functionality of the sensor. Therefore**, smart sensors are necessary to be introduce** that has the self-healing property **to improve its reliability** and to maintain its function even **after breakdown and healed again**. To overcome the fracture problem of the strain sensors, exploring and developing of self healing conductors by using the various materials and nano-composites are necessary. The self-healing materials are the smart materials that **can restore some or all of its functions after cutting or suffering by external damage** such as mechanical damage. The self-healing property of the materials are not only prolonging the lifetime of products but also reducing the wastage of the materials. Especially, this function increases the reliability of the sensors.

PRINCIPAL INVESTIGATOR AND COLLABORATOR

Dr. Gul Hassan – P.I
Prof. Dr. Ahmed Shuja – Co-P.I
Dr. Imran Murtaza – Co-P.I
Prof. Dr. Jinho Bae – Collaborator

Upscaling of an AI-enabled data mining platform for "Informed Decision Making (IDM)" in COVID-19 and future pandemic scenarios for Government of Pakistan



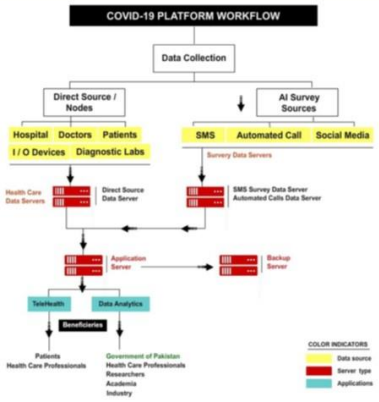
- **Principal Investigator:** Dr. Erum Jamil, Chairperson, Department of Electrical Engineering (F)
- International Islamic University, Islamabad
- **Co-Principal Investigator:** Dr. Gul Hassan, Assistant Professor, CAEPE
- **Industrial Partner:** Cloud Lab Pvt. Ltd, Karachi
- **Funding:** Rs 16.9 Million

The Goal

A **Cloud based Multi Node Tele Health Framework Supported by AI & BIGDATA** can help us easily connect to **"different data sources / nodes"** such as Hospitals, Doctors, Patients at home, Diagnostic Labs, Sensing devices and Data centers.

Centralized, data-based efficient Tele-medicine Support

Scheme of Activity

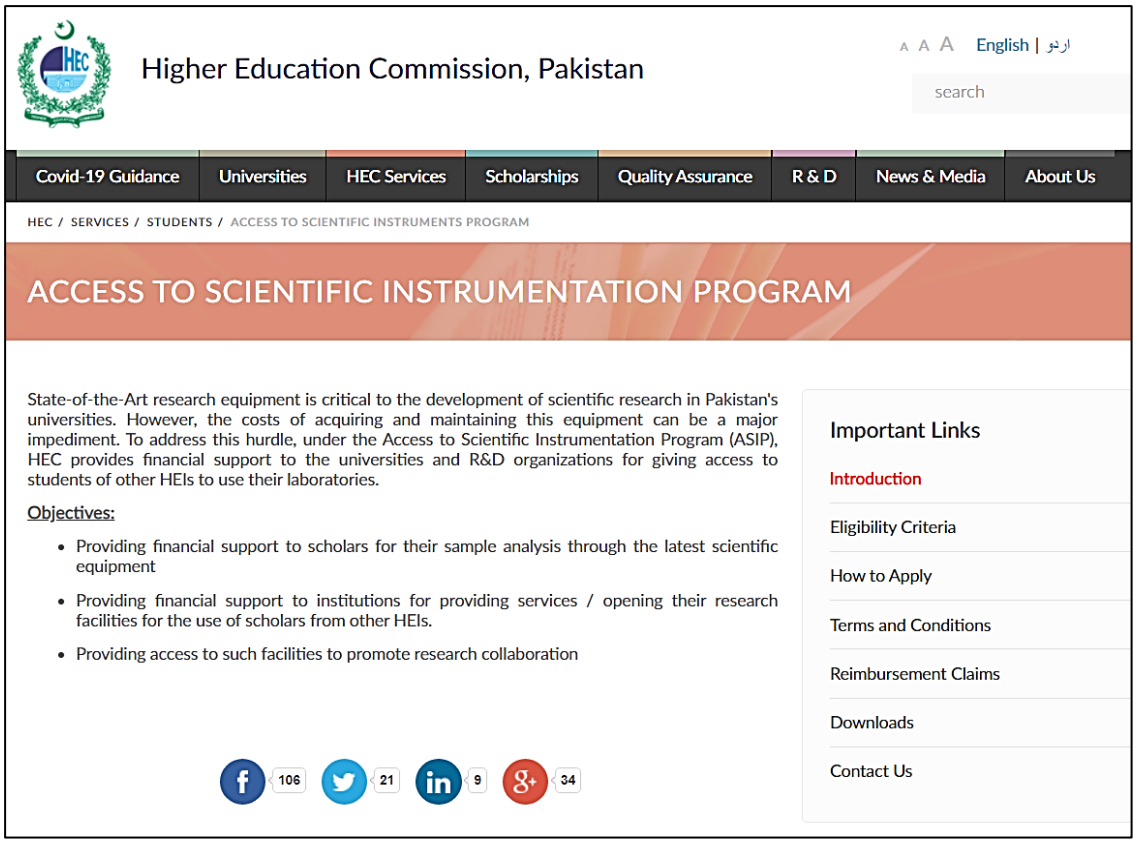


OBJECTIVES	OUTCOMES
OPTIMIZE AND UPSCALE • A robust AI based Tele Health Platform supported by Data Mining techniques. • Based on an already developed prototype • Help the Government of Pakistan and health care professionals to take informed deci7sion to counter / address COVID-19 and similar pandemic scenarios.	Product: An "optimized" and "up scaled" artificial Intelligence based mass scale survey using automated calls and SMSs Multi node common format input in unified format. Automated Filtration of patients: using Thermal Sensor hardware integration with Tele health framework Automated COVID-19 tests, surveys and data repositories using handheld devices
UTILIZE To develop a "post-testbed capability" for a "large access product" for massive applications with "Software – Machine" integration; which subsequently be utilized for versatile applications (e.g. Dengue, Smog etc.)	Bot-based remote health care monitoring of quarantined patients SMS based data input allowing people to input their health stats during quarantine-mode Appointment booking for Video Consultation during quarantine mode or as required by the patient/health provider. One Point Knowledgebase hub for Medical professionals Nationwide Centralized Medical Record access for confirmed & under observation COVID-19 patients.
TRAIN To train individuals in this highly desire able field who can then continue R&D and product development with direct socioeconomic impact in future	

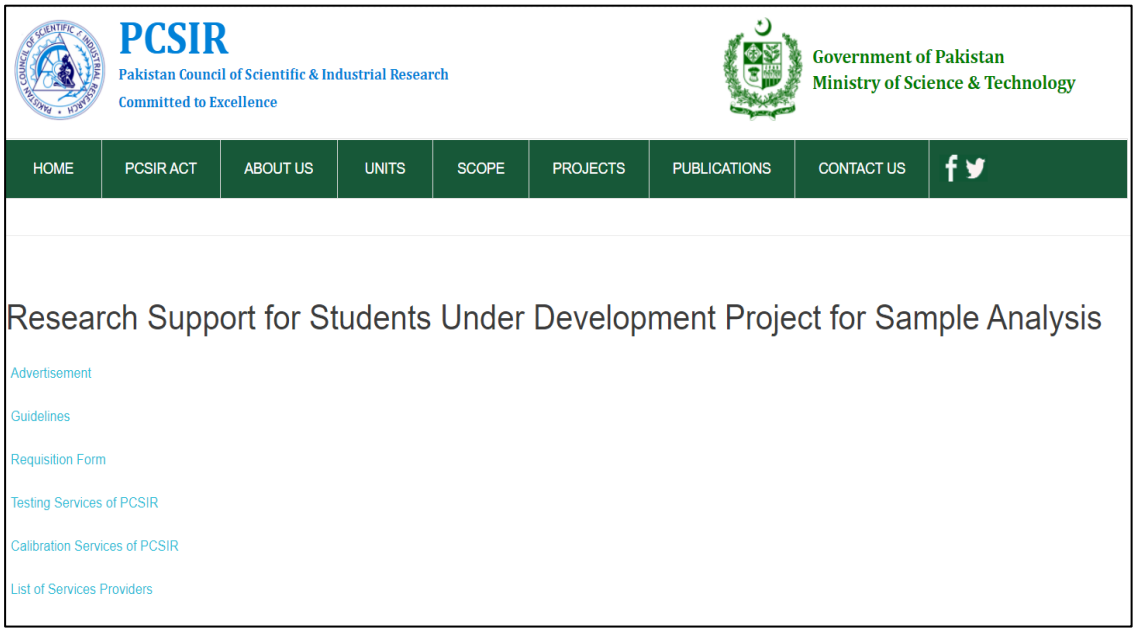
Engagement with the Society

ACCESS

In order to provide wide users drawn from all across the country with the facilities that are available inhouse, CAEPE has became part of the HEC "Access to Scientific Instrumentation Program" and providing the access to the users outside the university as well.



Apart from HEC ASIP portal, CAEPE is also part of the "Research Support for Students Under Development Project for Sample Analysis program" started by Pakistan Council of Scientific and Industrial Research (PCSIR).



US-Funded Workshops for Exposure of High School Students to Nanotechnology for Sustainable Energy in Pakistan

A project worth approximately ~1 Million PKR was awarded to Dr. Habib Ahmad against the Title, "**US-Funded Workshops for Exposure of High School Students to Nanotechnology For Sustainable Energy In Pakistan**." This project was organized at the Center for Advanced Electronics & Photovoltaic Engineering (CAEPE), IIU Islamabad under the supervision of U.S. Mission in Pakistan.

The project aimed to organize four scientific enrichment workshops for public and private SSC and HSSC science students across Islamabad and Rawalpindi for their exposure to Pakistan's sustainable energy and nanotechnology requirements. More than 120 enthusiastic direct (and thousands of indirect) male and female students and faculty members hailing from prestigious institutions of the twin cities benefited from these four workshops.

The participants got exposure to Pakistan's energy and nanotechnology requirements through fully packed 9-5 days of scientific fun activities. The activity sparked the curiosity of the students and broadened their imagination via practical demonstration.

Engagement with the National Stakeholders and Collaboration

A PARADIGM SHIFT IN ELECTRONICS AND ENERGY RESEARCH

CAEPE has contributed to the development of Pakistan's first National Semiconductors Plan-2022

CAEPE team is also contributing a great deal in developing the first National Electronics Policy

CAEPE is also advising on several national and international fora pertinent to the Science, Technology and innovation (STI) interventions

User's Spread within the Scientific disciplines

- Electrical and Electronic Engineering
- Physics/Nanotechnology
- Mechanical Engineering/Engineering Science/Materials Engineering
- Chemical & Process Engineering/Environmental Processes/ Civil Engineering
- Biomedical Engineering/ Bio Physics & Technology

Some of the frequent users of the Centre's facilities having **multiple and diverse** scientific projects are listed below:

	SOME OF THE FREQUENT USERS
▪	Department of Electrical Engineering (International Islamic University, Islamabad)
▪	Department of Mechanical Engineering (International Islamic University, Islamabad)
▪	Department of Civil Engineering (International Islamic University, Islamabad)
▪	Department of Physics (International Islamic University, Islamabad)
▪	Department of Environment Sciences (International Islamic University, Islamabad)
▪	Department of Biotechnology (International Islamic University, Islamabad)
▪	Sulaiman Bin Abdullah Aba Al-Khail – Centre for Interdisciplinary Research in Basic Science (SA-CIRBS) (International Islamic University, Islamabad)
▪	Bahria University, Islamabad
▪	School of Chemical & Material Engineering (NUST)
▪	College of Electrical and Mechanical Engineering (NUST)
▪	U.S Pakistan Center for Advanced Studies in Energy (NUST)
▪	COMSATS Institute of Information Technology, Islamabad
▪	COMSATS Institute of Information Technology, Abbottabad
▪	Gomal University, D.I Khan
▪	National Institute Of Lasers & Optronics (NILOP)
▪	The National Engineering and Scientific Commission (NESCOM)
▪	Riphah University, Islamabad
▪	The Islamia University of Bahawalpur
▪	Ummal - Qura university Makkah, KSA
▪	Federal Urdu University of Arts, Science & Technology, Karachi
▪	Mirpur University of Science and Technology
▪	University of Kotli, AJK
▪	Abdul Wali Khan University, Mardan
▪	Ghulam Ishaq Khan Institute (GIKI, Topi)
▪	National University of Computer and Emerging Sciences (FAST)
▪	Quaid-i-Azam University
▪	Allama Iqbal Open University
▪	Sardar Bahadur Khan Womens University
▪	University of Engineering and Technology (UET, Taxila)
▪	National University of Technology (NUTECH)
▪	Fatima Jinnah Women University, Rawalpindi
▪	National Center of Excellence in Physical Chemistry, University of Peshawar
▪	Pir Mehr Ali Shah Arid Agriculture, University Rawalpindi
▪	Rawalpindi Women University

CURRENT INTERNATIONAL COLLABORATIONS

- **Peking University Shenzhen Graduate School, China** (Focal Point: Prof. Ahmed Shuja Syed & Dr. Imran Murtaza)
- **Joint International Research Laboratory of Information Display and Visualization, Southeast University, Nanjing, China** (Focal Point: Prof. Ahmed Shuja Syed)
- **James Watt School of Engineering, Glasgow University, UK** (Focal Point: Prof. Ahmed Shuja Syed)
- **North Carolina State University, USA** (Focal Point: Dr. Saba Ashraf)
- **Berkeley Labs, California, USA** (Focal Point: Prof. Dr. Ahmed Shuja Syed)
- **Universitat Politechnica de Valencia, Spain** (Focal Point: Dr. Yousaf H. Khattak, Dr. Faisal Baig)
- **Jeju National University, Korea** (Focal Point: Dr. Gul Hassan)
- **The Institute of Thin Films, Sensors and Imaging (ITFSI), University of the West of Scotland** (Focal Point: Dr. Imran Murtaza)
- **Hanyang University Seoul South Korea (**Focal Person: Dr. Gul Hassan**)**
- **Georgia Institute of Technology, Atlanta, Georgia (**Focal Person: Dr. Habib Ahmad**)**

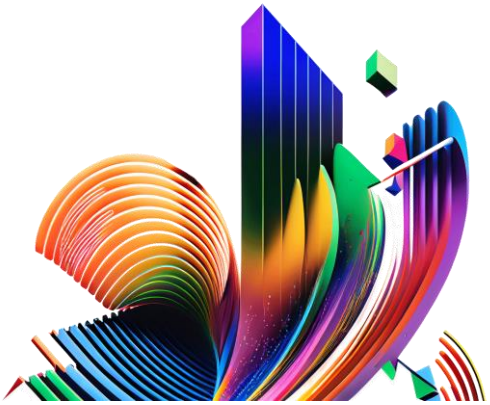
INDUSTRIAL PARTENER ENGAGED IN 2022-23

- Nizam Energy (PVT) Ltd, Pakistan
- Lightricity Ltd (LL), UK
- Cloud Labs (PVT) Ltd, Pakistan
- Punjab Oil Mills (PVT) Ltd, Pakistan
- Ultimate Engineering Consultants Peshawar, Pakistan
- NanoArgiSense (PVT) LTD, Pakistan
- Pak Macron Engineering Service (PVT) Ltd.

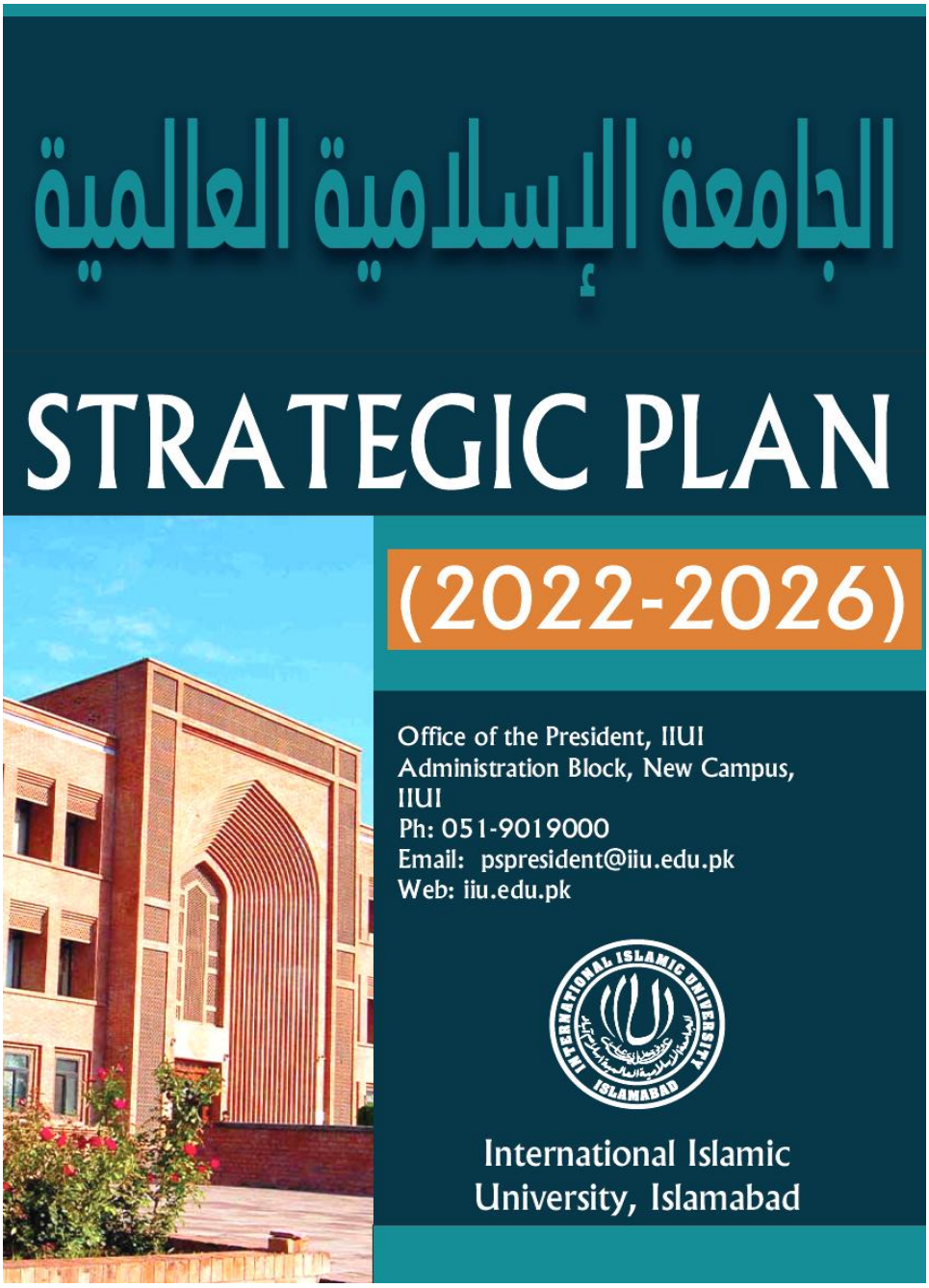
Research Students Using the Centre's Facilities

Alignment with the SDGs Drive

- Mapping of relevant undergraduate and graduate courses aligned with the scope of the Centre for sustainability and impact in various programs
- Addressing the big problems pertaining to SDG 7 and 9
- Dissemination of the research outcome with the National and International stake holders for policy formulation and impactful innovation aligned with SDG 4 and 17
- Majority of the research problems and all the grants are targeted to address the relevant sub goals within the SDG 4, 7, 9 and 17



Alignment with the University's Strategic Plan (2022-26)



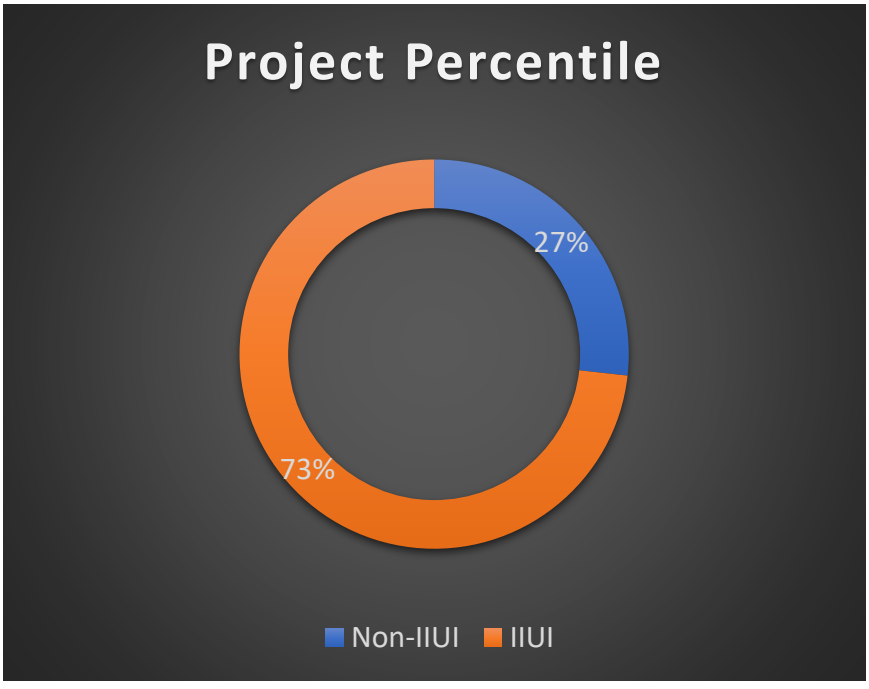
The Centre for Advanced Electronics and Photovoltaic Engineering (CAEPE) has aligned with the **Target Priority Area Number 1 (Growth and Academic Excellence)** and **Number 2 (Research and Collaborations) of IIUI's Strategic Plan 2022-26; Its strategies, Interventions and KPIs. CAEPE has its own strategic plan as well as action plan duly approved by University Authorities for implementation**

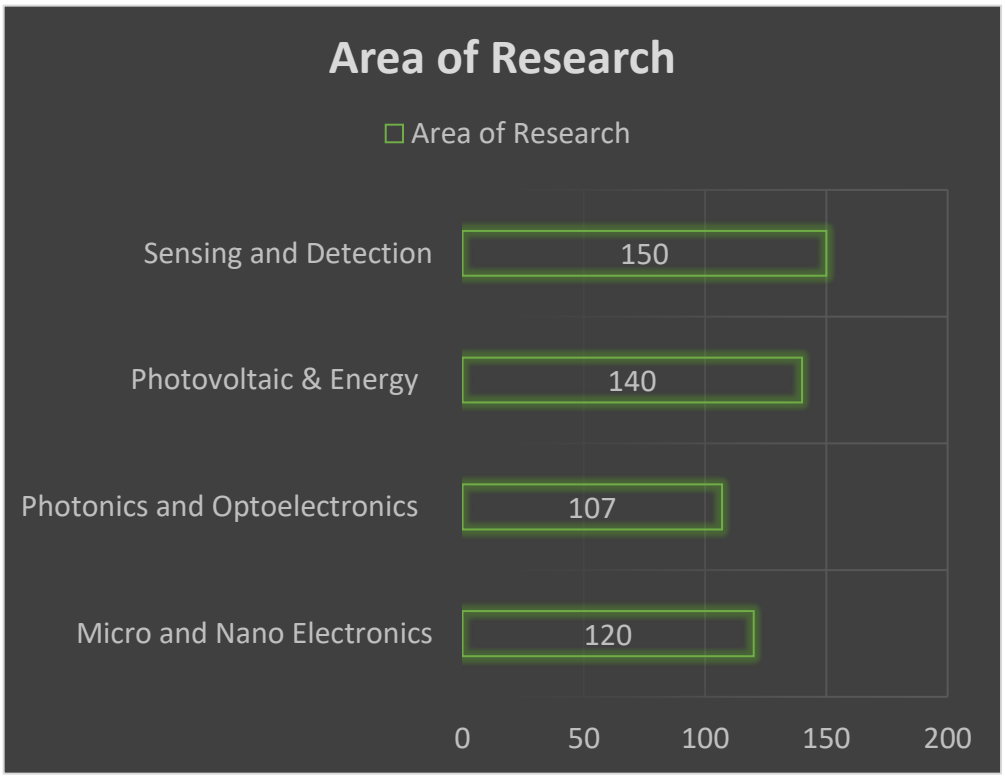
Coverage & Events

Impact Quantification

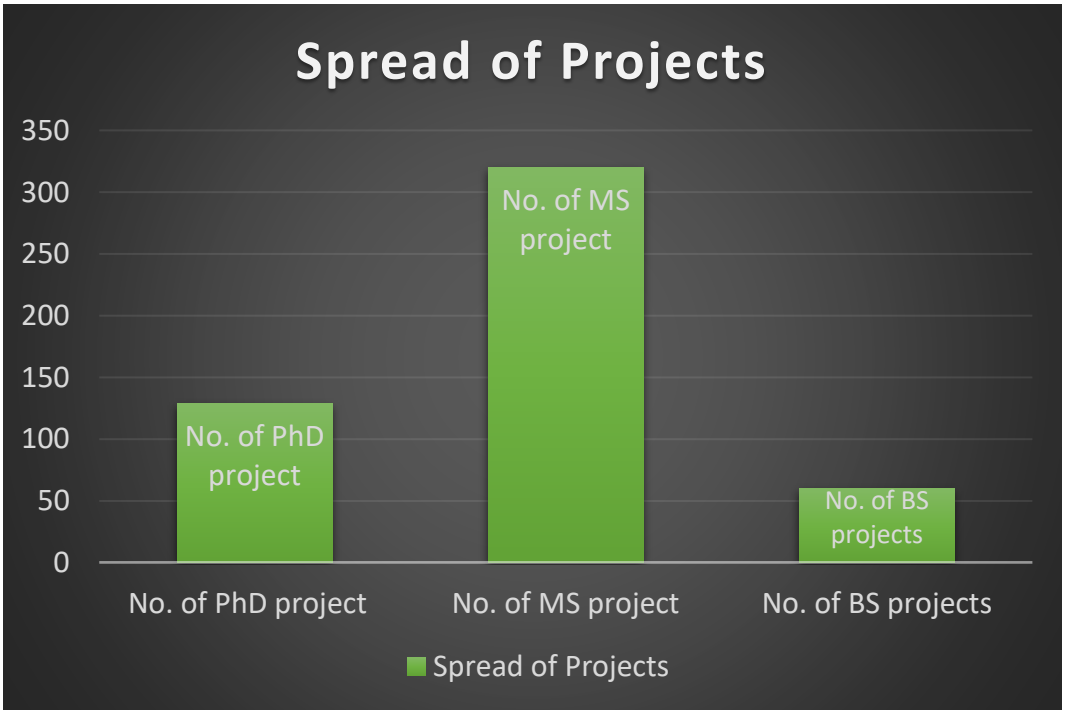
Impact Parameters	Quantum
Extent of Utility and Access	>510 scientific projects
Engagement of Returning Users	75%
Knowledge Creation & Dissemination in Process	>300 projects
Continual Skill Development	>6000 Runs
Responsiveness (Qualified Manpower Creation with Terminal Degrees in Dedicated Specialization; Collaborative Connections; Joint International Projects)	Manifold Increase on Yearly Basis

Sr. #	Content	No. of projects
1	Total number of the projects/users	510+
No. of student trained by the lab staff including BS Level Trainings on Design Suite		
2	Training Level - 1 (4 to 6 weeks)	250+
3	Training Level - 2 (Extensive Machine Training)	210+
4	No. of the department of Electrical Engineering (DEE), Faculty of Engineering & Technology (FET) students (MS/PhD) associated with the Centre (CAEPE)	60+
5	No. of Q.A Sessions on the machine	4500+
6	No. of International Training conducted of the lab staff	4
7	No. of National training conducted of the lab Staff	10

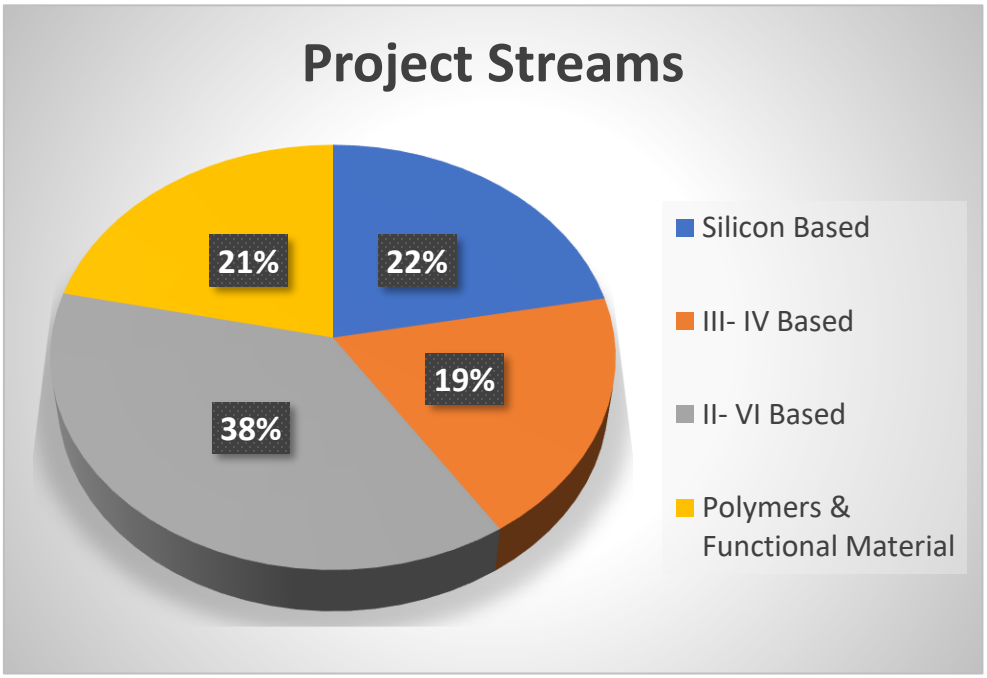




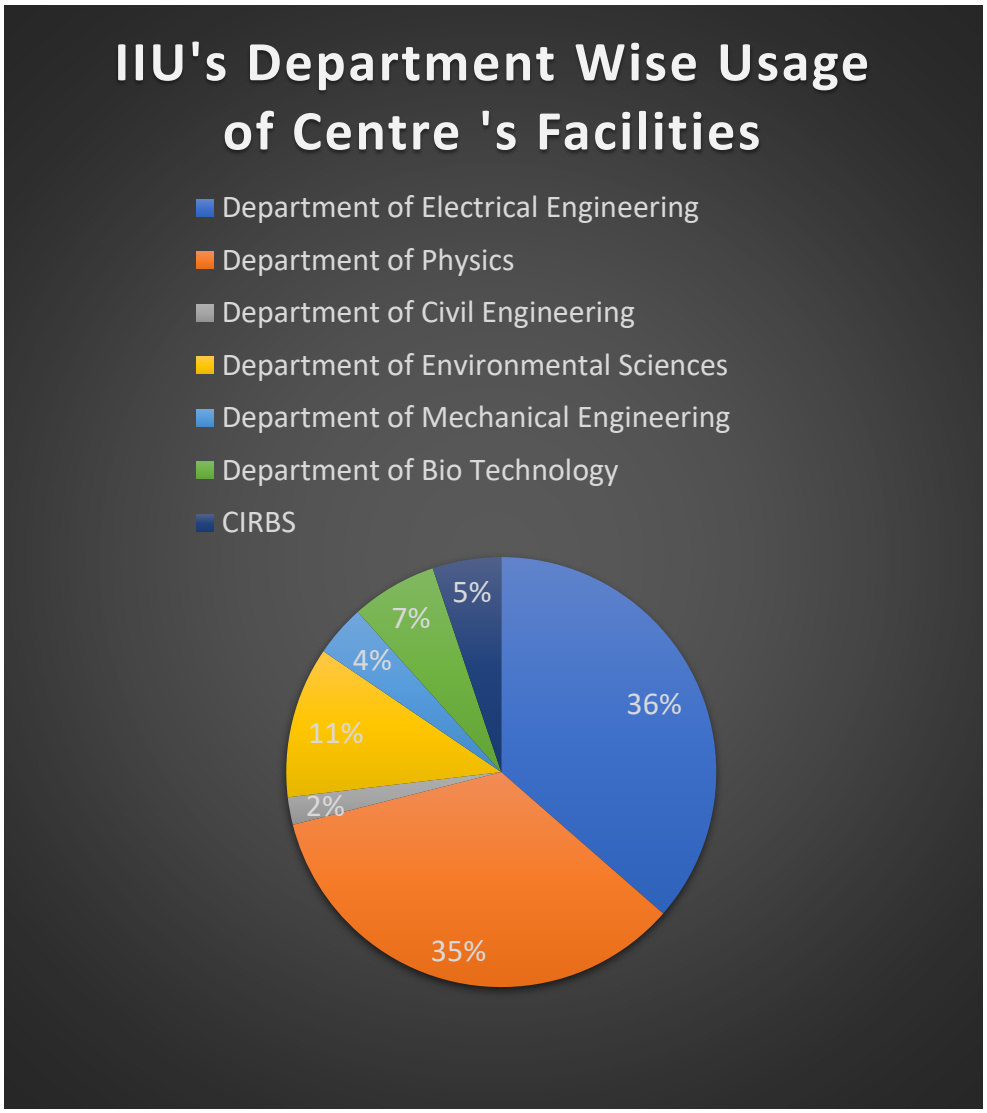
Spread of Research Activities: Theme Proportion



Proportion of Student - wise Usage of Facilities



Electrical & Optical Materials – Wise Usage of Centre's Facilities



FleEnSys

One-Day National Workshop on March 13, 2023

"Flexible Energy Systems (FleEnSys): Technology Perspective from Materials to Circuits"

Introduction

The Department of Physics at International Islamic University, Islamabad (IIUI) is dedicated to research, development, and education across all aspects of Physics with particular emphasis on nanotechnology.

The Centre for Advanced Electronics & Photovoltaic Engineering (CAEPE) at IIUI is a university-wide Centre aimed to develop the cross-disciplinary market-driven research focused on the applications of Advanced Electronics & Photovoltaic Engineering via processes, components and systems. Department of Physics & CAEPE also take pride in winning first ever ICRG International Grant for the university. The said grant is focused on the novel solutions towards Energy Harvesting & Storage Systems.

This event is continuation of a series of workshops under ICRG project hosted by Department of Physics & CAEPE. The project has already provided us with the modest funds to arrange the activity in year 2022.

Last Date for Registration
March 1, 2023

Organized by

Department of Physics & Centre for Advanced Electronics and Photovoltaic Engineering (CAEPE), IIUI

Chief Organizers

Dr. Imran Murtaza (Associate Prof)
Prof. Dr. Ahmed Shuja Syed

Chief Guest

Prof. Dr. Shahid Mahmood Baig
Chairman, Pakistan Science Foundation

Focal Persons/Organizers

Dr. Shaista Shahzada
Dr. Kashif Nadeem
Dr. Manzoor Ahmad
Dr. Taimoor Khurshid
Dr. Gul Hassan
Engr. Shoaib Alam
Mr. Shah Fahad
Mr. Muhammad Shahid Khan
Engr. Yousra Abid

Timing:
09:30 am – 4:00 pm

Venue:
Quaid-i-Azam Auditorium, Old Campus (Faisal Mosque) International Islamic University, Islamabad

Registration Link
https://forms.gle/33ru2gv1RgyoeiQC7

Workshop Secretary:
Dr. Muhammad Adeel Asghar

- Registration is free for all the attendees
- Certificates + Refreshment will be served

Scope

In the wake of ICRG grant's focus, the workshop will cover energy harvesters and storage devices along with their integration under the following scope:

- To cope with the challenges and provide opportunity for higher education institutes in Pakistan contributing towards science, technology and innovation in Energy related issues
- To promote indigenous research, paving way towards commercialization process with the similar cycle as in the developed countries

Who Should Attend?

Faculty Members, Research Students from IIUI & other Universities, Higher Management of HEIs/ORICs/HEC/PSF /Scientific Organizations, Policy-makers, Technology/ Market Leaders etc.

For Further Information:

Dr. Muhammad Adeel Asghar
+92 333 4036886
adeel.asghar@iiu.edu.pk
Dr. Manzoor Ahmad
+92 344 5427506
manzoor-ahmad@iiu.edu.pk

ExchangeAlumni
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PAKISTAN - U.S. ALUMNI NETWORK

US-Funded Workshops for Exposure of High School Students to Nanotechnology for Sustainable Energy in Pakistan

Revamped Scientific Outlook of 21st Century, 2023 (RSO-2023)

IMPORTANT DATES

CALL FOR ABSTRACT: August 20th, 2023

Abstract Submission Deadline : September 14th, 2023

Abstract Decision: 1st Oct - 10th Oct, 2023

Early Bird Registration Deadline : October 15th, 2023

Register Now !

https: tinyurl.com mry5jhbv


1ST INTERNATIONAL
VIRTUAL CONFERENCE ON
SUSTAINABLE ENERGY & CATALYSIS
ADVANCEMENT IN SUSTAINABLE ENERGY &
CATALYSIS FOR GREEN FUTURE
FEBRUARY 16-17, 2021


Sukkur IBA University
iCoMET 2023
4TH INTERNATIONAL CONFERENCE
ON COMPUTING, MATHEMATICS & ENGINEERING TECHNOLOGIES 2023
Sustainable Technologies for Socio-Economic Development
iCoMET 2023
March 17 - 18, 2023
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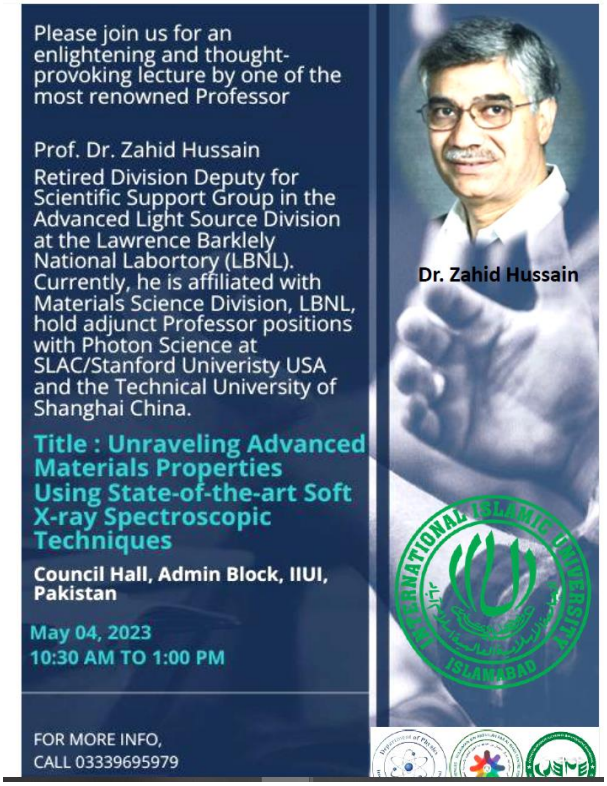

Please join us for an enlightening and thought-provoking lecture by one of the most renowned Professor
Prof. Dr. Zahid Hussain
Retired Division Deputy for Scientific Support Group in the Advanced Light Source Division at the Lawrence Barklely National Labortory (LBNL). Currently, he is affiliated with Materials Science Division, LBNL, hold adjunct Professor positions with Photon Science at SLAC/Stanford Univeristy USA and the Technical University of Shanghai China.
Title : Unraveling Advanced Materials Properties Using State-of-the-art Soft X-ray Spectroscopic Techniques
Council Hall, Admin Block, IIUI, Pakistan
May 04, 2023
10:30 AM TO 1:00 PM
FOR MORE INFO, CALL 03339695979
Dr. Zahid Hussain
INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD


INTERNATIONAL ISLAMIC UNIVERSITY ISLAMABAD
Please join us
Fortnight
Lecture SERIES
FET IIUI
Lecture No. 2
TUESDAY, May 9, 2023
2:30PM to 3:30PM
OUR SPEAKER
Prof. Dr. Engr. Ahmed Shuja Syed
Vice President (Research & Enterprises)
International Islamic University Islamabad
"Challenges in next generation energy and electronics From Research to Realization"
Who can attend?
Researchers
Graduate students
Faculty members
The session will be broadcast live on facebook on given link
LIVE
www.facebook.com/fetiiuofficial
More Information, contact dean.fet@iu.edu.pk
Faculty of Engineering and Technology, IIUI

Prof. Dr. Murtaza Najabat Ali...Founding Director at (Medical Devices Development Center MDDC) established under the special directive of PM Office, Founding CEO at N-ovative Health Technologies (A Public Sector company and a subsidiary of NUST) and Founding HoD and Professor of Biomedical Engineering Department at NUST visited the Centre

Mr. Farhat Jahangir Founder and CEO of GSMicroelecronics, San Jose, USA visited the Centre and discussed the possibilities of collaborative work in the area of semiconductors.




World renowned Distinguished Scientist, Dr. Zahid Hussain from Berkeley Labs USA visited the Centre today and gave an invited talk on some of his pioneering work in the field of soft X-rays.




Prof. Dr. Ibraheem Haneef from Aerospace engineering, NUST-Islamabad visited the Centre




Prof. Dr. Hammad Omer (COMSATS University Islamabad) and Dr. Fareeda Anjum (Director Research & Innovation) Higher Education Commission visited the Centre today




A Team from National Centre for Non-Destructive Testing (NCNDT) Visited CAEPE today. The team comprises of following members:

1. Mr. Jahan Zeb, Principal Engineer **2.** Mrs Amena Mohsin, Principal Engineer

3. Mr. Tahir Rahim, Senior Engineer




Students from University of Sialkot visited the Centre

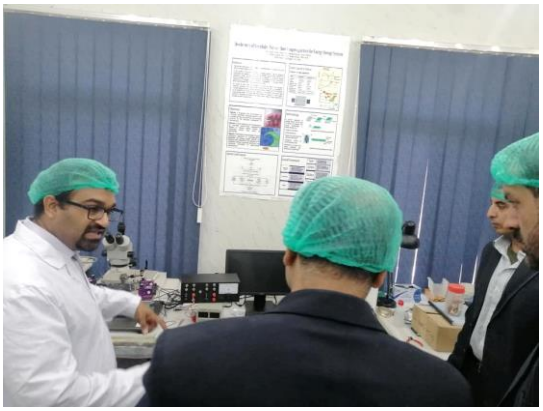


Dean Faculty of Computing and Director Business Incubation Centre visited the Centre




Dr. Muhammad Rafi, Dr. TAJ, Dr Tanveer, Dr. Zahid (Associate Professors) from the "National Institute of Lasers and Optronics" (NILOP) visited the Centre






Students from Saudi school Islamabad visited the Centre




Prof. Dr. Ni Nyoman Tri Puspaningsih Dra. Msi (Vice Rector for research innovation and community development) along with high officials from Universitas Airlangga – Indonesia visited the Centre



Prof. Dr. Muhammad Rafi- Head of Microfabrication Lab- National Institute of Lasers and Optronics (NILOP) along with team visited the Centre

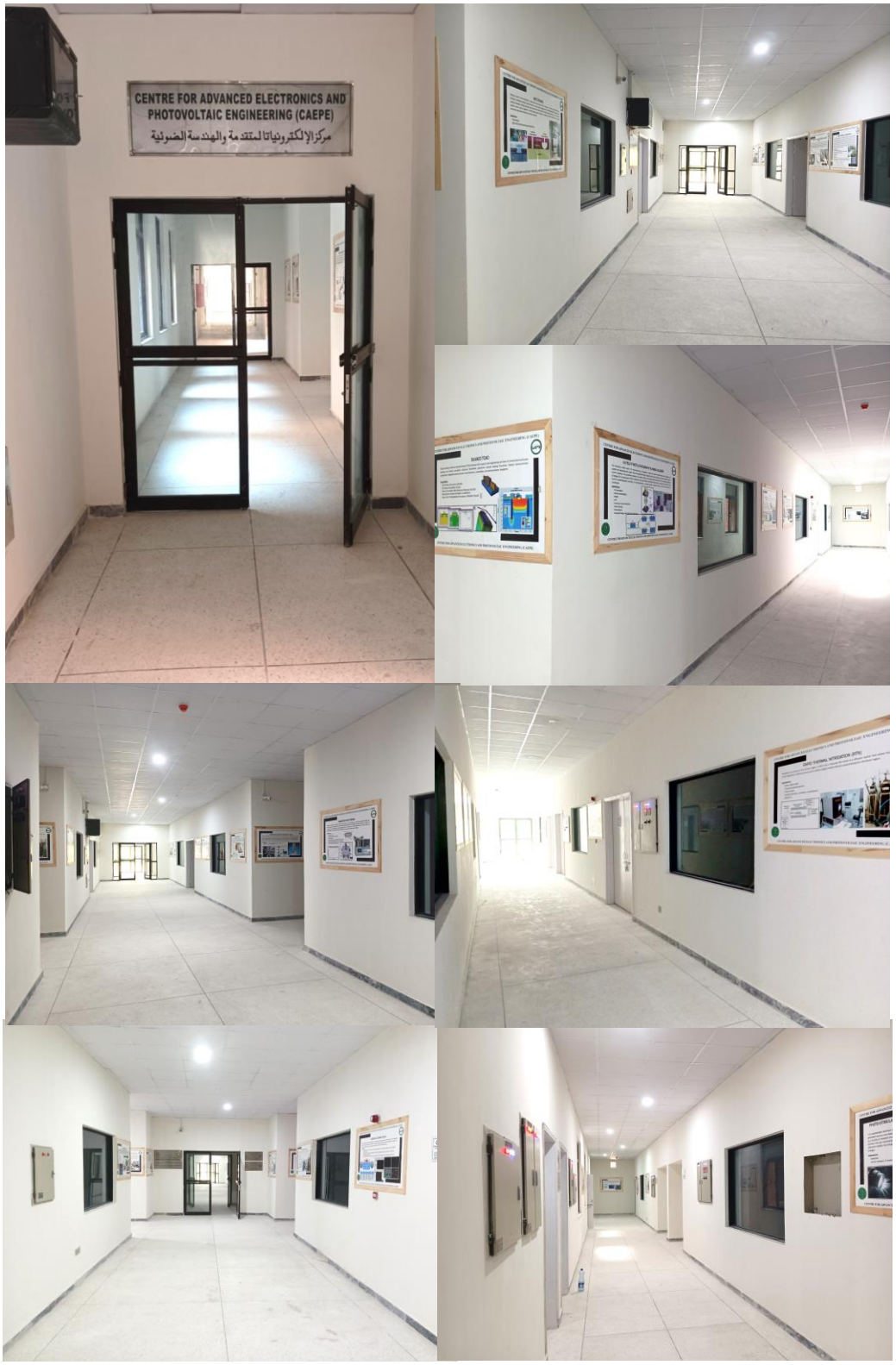
TEAM

- **Prof. Dr. Ahmed Shuja Syed**
- Vice President (R & E), IIUI/Founding Executive Director CAEPE
- **Dr. Gul Hassan**
- Assistant Professor/ Cleanroom Manager
- **Dr. Habib Ahmad**
- Assistant Professor CAEPE /DECE
- **Dr. Humaira Arshad**
- Post Doctorate Research Associate ICRG project
- **Engr. Shoaib Alam**
- Research Associate/Laboratories Manager
- **Engr. Muhammad Ali**
- Research Associate/Research Liaison Manager
- **Engr. Faraz Qayyum**
- Lab Engineer/I.T & Networking Manager (Focal Point: Device Design Suite)
- **Mr. Shah Fahad**
- Research Assistant ICRG Project
- **Engr. Yousra Abid**
- Funded PHD Student (ICRG Project)
- **Engr. Fakhra Farid**
- Funded MS Student (ICRG Project)
- **Engr. Fatima Sajid**
- Funded MS Student (ICRG Project)
- **Engr. Arfa Asif**
- Funded PHD Student (NRPU Project)
- **Maryam Bibi**
- Funded MS Student (NRPU Project)
- **Mr. Shoaib Waqas**
- Lab Technician
- **Engr. Majid Khattak**
- Lab Technician
- **Engr. Hammad Shakeel**
- Lab Technician

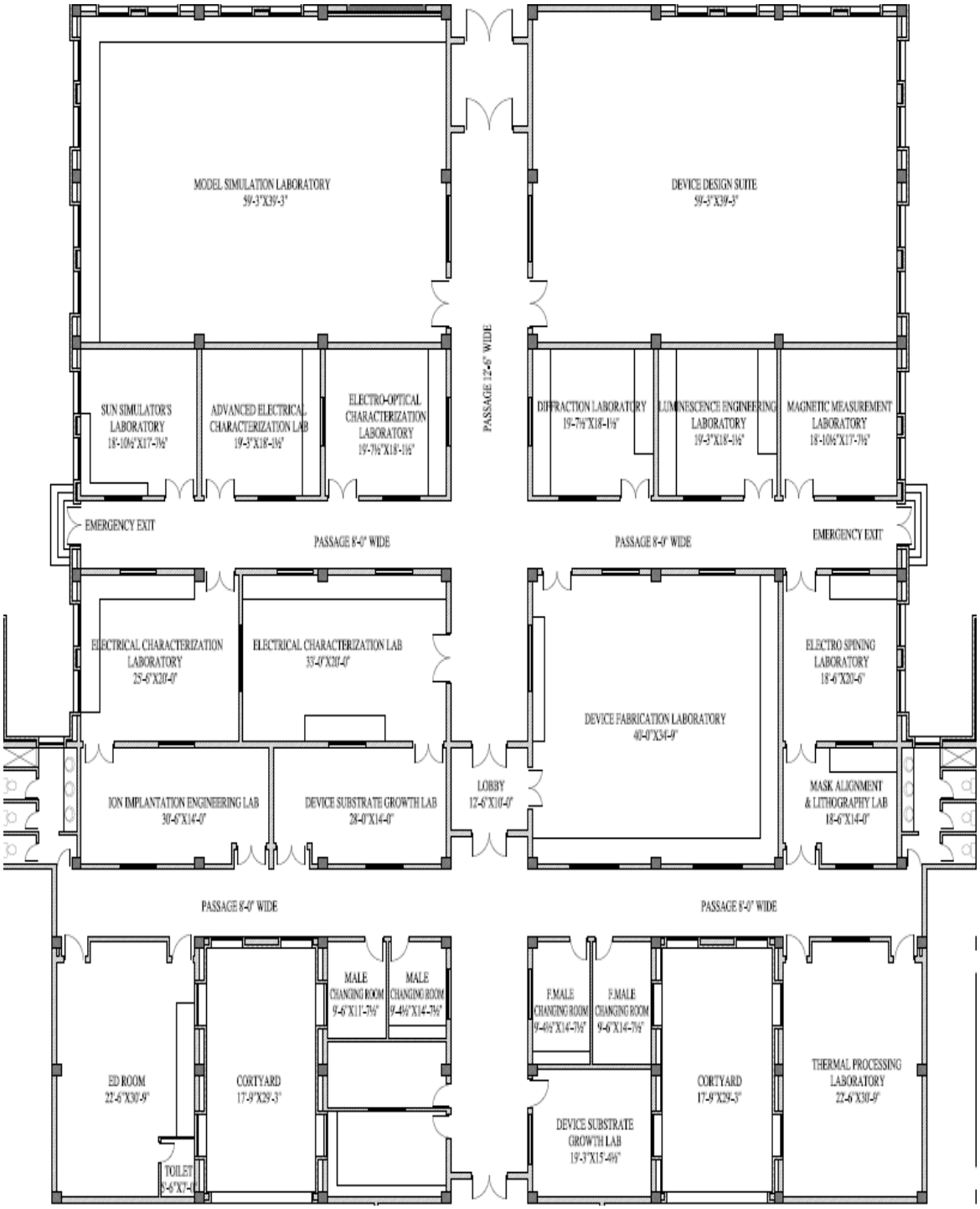
CAEPE AFFLIATES

- Dr. Imran Murtaza (IIUI)
- Dr. Khurram Hussain (IIUI)
- Dr. Rehana Riaz (IIUI)
- Dr. Hassan Murtaza (IIUI)
- Dr. Saba Ashraf (RWU)
- Dr. Adeel Asghar (QAU)
- Dr. Muhammad Sohail (IIUI)
- Dr. Yousaf Hameed Khattak (FUUAST)
- Dr. Faisal Baig (FUUAST)
- Dr. Zeeshan Najam (MNS UET)

CAEPE's NEW BUILDING SUPPORTED FROM GOVERNMENT OF PAKISTAN'S PSDP WITH THE COVERAGE OF 20,000 SQ.FT (COMPLETED AND SHIFTING IN PROGRESS)



CAEPE's NEW BUILDING SUPPORTED FROM GOVERNMENT OF PAKISTAN'S PSDP WITH THE COVERAGE OF 20,000 SQ.FT (COMPLETED AND SHIFTING IN PROGRESS)


MODEL SIMULATION LABORATORY
59'-3"X39'-3"
DEVICE DESIGN SUITE
59'-3"X39'-3"
PASSAGE 12'-6" WIDE
SUN SIMULATOR'S LABORATORY
18'-10½"X17'-7½"
ADVANCED ELECTRICAL CHARACTERIZATION LAB
19'-3"X18'-1½"
ELECTRO-OPTICAL CHARACTERIZATION LABORATORY
19'-7½"X18'-1½"
DIFFRACTION LABORATORY
19'-7½"X18'-1½"
LUMINESCENCE ENGINEERING LABORATORY
19'-3"X18'-1½"
MAGNETIC MEASUREMENT LABORATORY
18'-10½"X17'-7½"
EMERGENCY EXIT
PASSAGE 8'-0" WIDE
PASSAGE 8'-0" WIDE
EMERGENCY EXIT
ELECTRICAL CHARACTERIZATION LABORATORY
25'-0"X20'-0"
ELECTRICAL CHARACTERIZATION LAB
35'-0"X20'-0"
DEVICE FABRICATION LABORATORY
40'-0"X34'-9"
ELECTRO SPINING LABORATORY
18'-6"X20'-6"
ION IMPLANTATION ENGINEERING LAB
30'-6"X14'-0"
DEVICE SUBSTRATE GROWTH LAB
28'-0"X14'-0"
LOBBY
12'-6"X10'-0"
MASK ALIGNMENT & LITHOGRAPHY LAB
18'-6"X14'-0"
PASSAGE 8'-0" WIDE
PASSAGE 8'-0" WIDE
ED ROOM
22'-6"X30'-9"
CORTYARD
17'-9"X29'-3"
MALE CHANGING ROOM
9'-6"X11'-7½"
MALE CHANGING ROOM
9'-4½"X14'-7½"
TOILET
8'-6"X7'-0"
F.MALE CHANGING ROOM
9'-4½"X14'-7½"
F.MALE CHANGING ROOM
9'-6"X14'-7½"
CORTYARD
17'-9"X29'-3"
THERMAL PROCESSING LABORATORY
22'-6"X30'-9"
DEVICE SUBSTRATE GROWTH LAB
19'-3"X15'-4½"

CAEPE PROGRESS REPORT 2022-2023

ADDRESS

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Talk:

- Prof. Dr. Ahmed Shuja Syed (Executive Director)
- Dr. Gul Hassan (Cleanroom Manager)
- Engr. Shoaib Alam (Laboratories Manager)