NATIONAL CONFERENCE ON SIGNAL PROCESSING, SUSTAINABLE ENERGY MATERIALS, AND ASTRONOMY AND ASTROPHYSICS

It is a matter of great privilege that the School of Studies in Electronics & Photonics, School of Studies in Physics and Astrophysics, and Luminescence Society of India organized a 3-days National Conference on Signal Processing, Sustainable Energy Materials and Astronomy and Astrophysics (NSSEMA).

On the first day i.e., on the 16th of March 2023, the conference was inaugurated by chief guest Prof. Keshari Lal Verma, Honorable Vice Chancellor of Pt. Ravishankar Shukla University, Raipur, Guest of Honor Prof. S. K. Pandey, Former Vice-Chancellor, Pt. Ravishankar Shukla University, Raipur, Prof. A.G. Ramakrishnan, IISc, Bangalore, and Prof. K.V.R. Murthy, President, Luminescence Society of India.

The inaugural session was started with lamp lightning and the welcome speech by Prof. Kavita Thakur, Convener, and Head, S.O.S in Electronics and Photonics, and Prof. Nameeta Brahme, Convener and Head, S.O.S in Physics and Astrophysics. Guest of Honor Prof. K.V.R. Murthy has explored the opportunities in the area of Science and Technology, Luminescence, Physics, Electronics and Photonics are connected and briefly described the activities of LSI. Guest of Honor Prof. A.G. Ramakrishnan told researchers to emphasize their art of learning and gave best wishes to everyone. Guest of Honor Prof. S. K. Pandey was motivated by sharing his views. The informative speech was delivered by our Vice Chancellor, Prof. Keshari Lal Verma followed by the release of souvenirs. A vote of thanks was delivered by Prof N.K. Chakradhari of S.O.S in Physics.







The technical session-1 was started with an invited talk by **Prof. K.V.R Murthy**, President, of the Luminescence Society of India. He gave a presentation on the topic "**LUMINESCENCE MATERIALS AND APPLICATIONS**" in which he discussed different types of luminescent materials and their advantages and application in daily life. The second plenary talk was delivered by **Prof. K.V.R Chary** of Rowan University, USA on the topic **"PHYSICS AND CHEMISTRY OF MAGNETISM AT NANO-SACLE".** He discussed the fundamentals of magnetism and rules for predicting magnetic order in oxides and the safe handling of nanomaterials. **Prof. G.C. Anupama** of IIA, Bengaluru also delivered a plenary talk on the topic "**THERMONUCLEAR SUPERNOVAE AS COSMOLOGICAL PROBES"**. She discussed the nature of diversity to use type Ia supernovae as cosmological probes.

After lunch, the technical session-2 was started, **Prof. Dipankar Banerjee** of ARIES, Nainital, delivered the first invited talk on the topic "**ADITYA L1 MISSION TO STUDY THE VARIABILITY OF OUR NEAREST STAR"**. He discussed the sun as a variable star and explained why we need to study the variability of our nearest star **"THE SUN"**. **Prof. B.N. Jagatap** of IIT, Bombay also delivered the second invited talk on the topic "**MATERIALS FOR SUSTAINABLE DEVELOPMENT: CHALLENGES AND OPPORTUNITIES"**. He discussed the key issues of sustainable development and provided some useful examples of S&T efforts. **Prof. P.D. Sahare** of Delhi University, Delhi also delivered a third invited talk on "**MECHANOLUMINESCENCE IN $SrAl_2O_4$: Eu PHOSPHOR: EFFECT OF PARTICLE SIZE"**. He discussed mechanoluminescence and elasto-mechanoluminescence and their measurements.

There was also parallel technical session-3 going on, of **Prof. A.G. Ramakrishnan** of IISc, Bangalore delivered an invited talk on the topic "**ANALYZING PATTERNS IN EEG: FROM BIOMETRICS TO ALTERED STATES OF CONSCIOUSNESS"**. He discussed the patterns in EEG signals under different conditions. **Prof. G.V.V Sharma** of IIT, Hyderabad also delivered an invited talk on the topic "**SIGNAL PROCESSING IN HIGH SCHOOL"**. He discussed simple examples of signal processing in high school mathematics and physics like probability, etc. **Prof. Rekha Garg** of Dr. HS Gour University, Sagar also delivered an invited technical talk on the topic "**ZINC BASED CHALCOGEDIDE NANOMATERIALS FOR VARIOUS APPLICATIONS"**. She discussed the affordable solution to environmental pollution and new dimensions to the pharmaceutical and medical industry through ZnE chalcogenide. **Prof. Narendra D Londhe** of NIT, Raipur also delivered an invited technical talk on the topic "**MEDICAL IMAGE SEGMENTATION AND CLASSIFICATION USING DEEP LEARNING"**. He discussed the CADx for medical image evaluation for reducing manual error. 12 orals were presented by delegates from various institutes and colleges of Chhattisgarh and outside the state.

A colorful event was organized on the first day evening in the seminar hall of S.O.S in Physics and Astrophysics by students of S.O.S in Electronics and Photonics and S.O.S in Physics and Astrophysics for the refreshment of the delegates.













On the second day of the conference i.e on 17th March 2023, technical session-4 was organized. The session started with an invited talk by **Prof. B.S. Panigrahi** of IGCAR, Kalpakkam on the topic "**EFFECT OF UO_2^{2+} ON EUROPIUM VALENCE AND INTERALIA ENERGY TRANSFER IN $SrBPO_5$**" in which brief description about uranium co-doping and color tuning of Eu doped phosphor. Followed by another invited talk by **Prof. P.K. Bhatnagar** of Delhi University, Delhi on the topic "**NANOMATERIALS-THEIR APPLICATIONS IN FLEXIBLE ELECTRONICS AND SENSORS**" in which a brief description of nanomaterials and nanocomposites with fine application this this in flexible electronics and VOC sensors. After a tea

break , in technical session-5 a very interesting and conceptual invited talk was delivered by **Prof. S.J. Dhoble** of RTM University, Nagpur, on **"INNOVATIVE APPLICATION OF FLY ASH FOR HIGH DOSE THERMOLUMINESCENCE RADIATION DOSIMETRY"**. He discussed the characteristics of fly ash and the innovation of fly ash. **Prof. S. A. Hashmi** of Delhi University, Delhi, in his invited talk focused on "**REDOX-ACTIVE GEL POLYMER ELECTROLYTES FOR HIGH ENERGY STORAGE"**, their issues related to the fabrication of efficient supercapacitors along with a few approaches to enhance the energy of devices. He also discussed the performance characteristics of the solid-state EDLCs and Gel Polymer Electrolytes. **Prof. Sivakumar Vaidyanathan** of IIT, Hyderabad also delivered an invited talk on the topic "**LANTHANIDE BASED LUMINESCENT MATERIALS FOR SMART LIGHTNING"**. He discussed the various trivalent europium-based red-emitting phosphors with different crystal structures with special emphasis on their optical property. **Prof. Rakesh Chandran S.B** of S.D. College, Alappuzha delivered an invited technical talk on the topic "**ELECTROSTATIC ENVIRONMENT OF THE MOON AND THE CHALLENGES FOR HUMAN AND ROBOTIC EXPLORATION"**. He discussed how the charging properties of lunar dust grain are important as well as the mechanism of dust environment and levitation.

In a parallel technical session-6, **Prof. S.K. Omanwar** of Amravati University, Amrawati delivered an invited talk on the topic "**ENERGY EFFICIENT QC- LUMINESCENT MATERIALS FOR SUSTAINABLE DEVELOPMENT"**. He discussed useful materials for lightning and photovoltaic conversion enhancement. **Prof. K.K. Biswas** of IIT, Delhi delivered an invited talk on the topic "**DISEASE IDENTIFICATION IN AGRICULTURE USING DEEP LEARNING ON EDGE DEVICES''**. He discussed how huge models can be compressed using heuristics approaches and approaches to compress a deep learning network to efficiently segment the leaf images to indicate the extent of damage to the leaf. **Prof. Dipti Patra** of NIT, Rourkela delivered an invited talk on the topic "**BIOMEDICAL SIGNAL PROCESSING AND ANALYSIS TECHNIQUES: APPLICATIONS TO ECG SIGNAL''**. She discussed the ECG signal processing techniques and analysis. She also explored early detection and prediction of myocardial infarction and sudden cardiac death. **Prof. M. Shriniwas** of MS University, Baroda delivered an invited technical talk on the topic "**LUMINESCENCE OPTIMIZATION OF THERMALLY STABLE DOUBLE PEROVSKITE FOR LED AND TLD APPLICATION"**. He discussed the synthesis of stable double perovskite through the combustion method and the examination of it through XRD techniques. **Prof. Rohit Raja** of GGU, Bilaspur also delivered an invited technical talk on the topic "**SYNTHESIS, XRD, NLO, CHNSO, DIELECTRIC, PHOTOCONDUCTIVITY AND BIOSTUDIES OF DIETHYL 2-AMINO-5-{4-[BIS(4-METHYLPHENYL) AMINO] BENZA-MIDO}THIOPHENE-3,4-DICARBOXYLATE(DABMPABTD)MACRO,NANOCRYSTALS FOR DEVICE FABRICATION AND ELECTRONIC USES"**. He discussed how organic materials are predominant over their pair-offs based on their intense applications and vital utilities and the solution growth approach is used to create the DABMPABTD crystal at reduced pressure. **Prof. Sapna Singh Kshatri** of SSIPMT, Raipur also delivered an invited technical talk on the topic "**BIOMEDICAL SYSTEMS SUPPORTED BY ARTIFICIAL INTELLIGENCE (AI) AND INTERNET OF MEDICAL THINGS (IoMT) FOR SMART HEALTHCARE"**. She discussed the technological and engineering challenges and prospects for AI-based cloud-integrated personalized IoMT devices for designing efficient POC biomedical systems suitable for next-generation intelligent healthcare. After lunch, 12 orals and 61 posters were presented by delegates

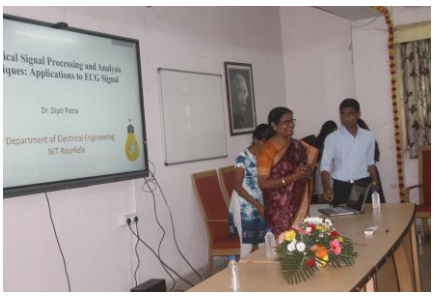
from various institutes and colleges of Chhattisgarh and outside the state.

After tea break, in technical session-7, **Prof. M.L. Verma** of Sri Shankaracharya College, Bhilai delivered an invited technical talk on the topic "**EFFECT OF STRUCTURE IN ELECTRONIC AND OPTICAL PROPERTIES OF CdX AND ZnX (X=O, S, Se, Te): Ab INITIO MODELING"**. He discussed the fundamentals of density functional theory (DFT), its benefits and limitations, and its application to study various properties of materials at different phases. **Prof. Shalinta Tigga** of GGU, Bilaspur delivered an invited technical talk on the topic "**SYNTHESIS, CHARACTERISATION AND LUMINESCENCE INVESTIGATIONS OF Ce^{3+} AND Dy^{3+} ACTIVATED $BaMgAl_{10}O_{17}$ PHOSPHORS"**. She discussed the BAM: Ce and BAM: Dy phosphors preparation by combustion method and their structural and morphological properties characterization by XRD, EDS, and FESEM.

In parallel session-8, **Prof. Pawan Kumar Patnaik** of BIT, Durg also delivered an invited technical talk on the topic "**DIFFERENT APPROACHES OF DEEP LEARNING TECHNIQUES FOR IMAGE PROCESSING"**. He discussed the application of deep learning in image analysis, including image recognition, object detection, segmentation, and generation, and explored CNNs, RNNs, and GANs.












On the third day of the conference i.e on 18th March 2023, technical session-9 was organized. The session started with a technical talk by **Prof. R.K Pandey**, Amity University, Raipur on the topic **"OXIDE NANOSTRUCTURES: NOVEL PROPERTIES AND APPLICATIONS**". He has delivered a very interesting talk in very simple words about the recent developments in the emerging area of nanomaterials science and technology. **Prof. S. K. Pandey** delivered an extensive talk on the topic "**THE WORLD OF GRAVITY: FROM NEWTON TO EINSTEIN"**. He shared a glimpse of the world of gravitation from the era of Newton to Einstein at the very elementary level to enhance the understanding of the ubiquitous nature of gravity, the weakest of all known forces of nature. After tea break, in technical session-10 the next invited talk was delivered **by Prof. C. Shivakumara** of IISc, Bangalore, on "**MULTIFUNCTIONAL MATERIALS FOR ENERGY AND ENVIRONMENTAL SUSTAINABILITY"**. He focused on the facile synthesis, and structural characterization of rare earth ion-activated scheelite-type tetragonal AWO4, AmoO4 (A=Ca, Sr, Ba, and Pb) and layered BiOX (X= F, Cl, and Br) Phosphors and their luminescence properties. **Prof. G.R. Sinha** of IIIT, Bangalore, delivered a talk in the "**AI INTERVENTION IN STUDY OF MINDFUL PRACTICES OF INDIAN KNOWLEDGE SYSTEM FOR SUSTAINABLE HEALTH".** He focused on AI intervention and the use of machine learning approaches for understanding the impact of the practices in the improvement of quality of life, community wellness, and sustainable health. **Prof. O.P. Thakur** of SSPL, DRDO, New Delhi, delivered a talk in the "**SILICON CARBIDE AS THIRD GENERATION WIDE BAND GAP SEMICONDUCTOR MATERIALS FOR HIGH POWER AND HIGH-FREQUENCY DEVICES".** He discussed the relevant technical details about silicon carbide. **Prof. Tanmay Badapanda** of CV Raman University, Bhubaneswar delivered talk in the **"EXPLORATION OF FERROELECTRIC AND PIEZOELECTRIC PROPERTIES FOR ENERGY STORAGE AND HARVESTERS APPLICATION".** He focused on demonstrating the dielectric effect of electric field amplitude and frequency on the polarization and mechanical strain performance and electromechanical parameters of BaZr0.05Ti0.95O3 ceramic. **Prof. G. Nag Bhargavi** of Govt. College, Dharsiva delivered talk in the "**COMPLEX IMPEDANCE, ELECTRIC MODULUS AND CONDUCTIVITY STUDIES OF GADOLINIUM MODIFIED BARIUM ZIRCONIUM TITANATE PEROVSKITE CERAMICS''.** She discussed synthesization by conventional solid-state method and study through XRD technique.

In parallel technical session-11, **Prof. Neelam Sinha** of IIIT, Bangalore delivered talk in the "**SURGICAL VIDEO ANALYSIS USING DEEP LEARNING".** She focused on challenges in analyzing videos of Laparoscopic Cholecystectomy (LC) and some recent techniques that utilize Deep Learning framework for understanding the LC surgical videos. **Prof. Bipin Gupta** of CSIR-NPL, New Delhi delivered talk in the "**INDIGENOUS DEVELOPMENT OF STRATEGIC LUMINESCENT MATERIALS FOR SOCIETAL BENEFITS TO MAKE SELF-RELIANT INDIA".** He discussed about how development of novel materials are important and how it can make us self-reliant. **Prof. Y.H. Gandhi** of MS University, Barodara, delivered a talk in the "**THERMOLUMINESCENCE (TL) SENSITIVITY OF 110'C GLOW PEAK IN NANO SYNTHETIC QUARTZ MATERIAL".** He focused on nano synthetic quartz, ball-milled technique, thermal treatment, ionizing radiation, thermoluminescence and XRD. **Prof. Ayush Khare** of NIT, Raipur delivered talk in the "**ADVANCEMENTS IN PEROVSKITE**

PHOTOVOLTAICS". He discussed on some latest advancements in the field of perovskite solar cells. **Prof. Ishwar Prasad Sahu** of IGNTU, Amarkantak delivered talk in the "**STRUCTURAL, THERMAL AND LUMINESCENCE PROPERTIES OF EUROPIUM (III) ACTIVATED STRONTIUM ZIRCONIUM SILICATES PHOSPHORS FOR LIGHTNING APPLICATIONS".** He focused on synthesization, characterization and properties of europium (III) activated strontium zirconium silicate phosphor.

After lunch, in technical session-12, a very interesting invited talk by **Prof. Bikesh Kumar Singh** of NIT, Raipur delivered a talk on "**BRAIN NETWORK ANALYSIS IN DYSLEXIC CHILDREN DURING AN ARITHMETIC TASK: AN EEG STUDY".** He emphasized different functional connectivity changes in the brain network of dyslexic kids using EEG signals while performing math tasks and study indicates that dyslexic brain networks function poorly during arithmetic tasks and have altered network topology. **Prof. Laxmikant Chawre** of CBS, PRSU, Raipur delivered talk in the "**REVEALING THE INCONSPICUOUS: A TECHNIQUE FOR DETECTING LOW SURFACE BRIGHTNESS GALAXIES".** He discussed shed light on the hidden universe and showcase the potential for detecting previously unknown objects in cosmos. 9 orals were presented by delegates from various institutes and colleges of Chhattisgarh and outside state.

At the end, a valedictory program was organized. The chief guest Prof. K.V.R. Chary, Guest of Honor Prof. B.S. Panigrahi, and organizers Prof. Kavita Thakur, Prof. Nameeta Brahme, Prof. D.P. Bisen, Prof. N.K. Chakradhari and Prof. Y.K. Mahipal was present. Program has been started with lamp lightning and was followed by honoring the guest with presents as a memory. Briefing of NSSEMA-23 has been done by Prof. N.K. Chakradhari. Prof. K.V.R Chary addressed that the conference was market disciplinary and informative. Prof. B.S. Panigrahi said that the organization

was quite good and everybody actively participated. At the end Prof. D.P. Bisen thanked everyone for the successful conduction of NSSEMA-23. Followed by cash prize distribution by LSI to best oral and best poster delegates.