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Dr Ravindra Kumar Gupta

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Google Scholar: Citations 1145; h-index 18; i10-index 36

Academic Qualifications

Degree	Duration	Notification Date	Subjects	School/ College	Univ.
PhD †	01/1992-03/1997	01/04/1997	**Physics** (Solid State Ionics/ Materials Science)	School of Studies in Physics	Pt. Ravishankar Shukla University, Raipur, India
MPhil$	09/1990-08/1991	01/04/1992	**Physics** (Classical Electrodynamics and Quantum Theory of Radiation, Advanced Quantum Mechanics, Adv. Solid-State Phys.)	School of Studies in Physics	
MSc	07/1988-06/1990	23/11/1990	**Physics** (Mathematical methods, Classical Mechanics, Quantum Mechanics, Classical Electrodynamics, Statistical Phys., Nuclear Phys., Solid-State Phys., Electronics)	School of Studies in Physics	
BSc	07/1985-06/1988	30/06/1988	**Physics**, Chemistry, Mathematics	Govt. Digvijay Col., Rajnandgaon	

† **Thesis Title:** Studies on Electrical Properties and Battery Characteristics of Some Composite Electrolytes
Advisor: Prof. Rakesh Chandra Agrawal (School of Studies in Physics, Pt. R. S. Univ., Raipur), a PhD student of Late Prof. Suresh Chandra, BHU, India

$ **Dissertation Topic**: Sensitization effect in the photoconductivity of ZnO
Advisor: Prof. Shashi Bhusan (School of Studies in Physics, Pt. R. S. Univ., Raipur).

Employment

From - To (D/M/Y)	Position	Institution (Department) Place, Country	Nature of Work
22/04/2011- To date	Assistant Professor	King Saud Univ. (King Abdullah Institute for Nanotechnology; Optometry) Riyadh, **Saudi Arabia**	Teaching UG: Optics Research: Energy Materials
01/09/2009- 31/01/2011	Postdoctoral Fellow	Sognag Univ. (Chem. & Biomolecular Eng.) Seoul, **South Korea**	Research: Solar Cells
01/09/2007- 31/08/2009	BK-21 Fellow	Yonsei Univ. (Mater. Sci. & Eng.) Seoul, **South Korea**	Research: SOFC
26/09/2005- 31/08/2007	Postdoctoral Fellow	Inha Univ. (Mater. Sci. & Eng.) Incheon, **South Korea**	Research: SOFC
24/11/2003- 31/07/2005	Assistant Professor	Debub Univ. (Applied Physics) Awassa, **Ethiopia**	Teaching UG: Physics
01/12/2002- 20/11/2003	DST Scientist/ Postdoctoral Fellow	Pandit Ravishankar Shukla Univ. (School of Studies in Physics) Raipur, **India**	Research: Solid Electrolytes Teaching PG: Physics
01/12/2001- 30/11/2002	Research Professor	Inha Univ. (Mater. Sci. & Eng.) Incheon, **South Korea**	Research: Inorganic-organic hybrids, Sol-gel
11/04/2000- 31/12/2000[1]	Scientist	Lithium Power Technologies, Inc., Manvel, **USA**	Research: Batteries
01/10/1997- 30/11/2001	CSIR Research Associate [2]	Pandit Ravishankar Shukla Univ. (School of Studies in Physics) Raipur, **India**	Research: Solid Electrolytes Teaching PG: Physics
01/02/1997- 30/08/1997	Lecturer (Part time)	Raipur Institute of Technology, Raipur, **India**	Teaching UG: Engg. Phys.

Teaching Area/ Interest **Experience**: **9.4** years

Various courses of Physics and Renewable Energy.

Research Area/ Interest **Experience**: **26.5** years.

Solid Electrolytes and Electrodes for Renewable Energy Sources and Batteries; Nano-materials for Energy Application

[1] Special leave from the CSIR, India.
[2] Started the teaching assignment as a lecturer from Aug.'1997, Univ. letter no. 6624/Adm./97 dt. 9/9/1997.

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Research Papers Published: 74 **No. of ISI Papers: 54**

Dye-Sensitized Solar Cells: **20** Batteries: **35**

Solid Oxide Fuel Cells: **9** Inorganic-Organic Hybrids & Dielectric Materials: **10**

Conferences/ Workshops Attended: **23** (including an Invited talk)

Research Projects Involved In

- As a Principal Investigator: 3
- As a Co-Investigator, Research Professor, Research Associate or Postdoctoral Fellow with Dr. Idriss Bedja, King Saud Univ., Riyadh, Saudi Arabia; Prof. Hee-Woo Rhee, Sogang Univ, Seoul, Korea; Prof. Chin Myung Whang, Inha Univ., Incheon, Korea; Prof. Yong Soo Cho, Yonsei Univ., Seoul, Korea; Lithium Power Technologies, Inc., Manvel, USA; Prof. Rakesh C. Agrawal, Pt. Ravishankar Shukla Univ., Raipur, India.

Membership of Learned Societies

- Life member, Materials Research Society of India, No. LMB396

Awards

- Achieved **Best Poster Award** for paper entitled "XRD Analysis of Sol-Gel Derived Novel SOFC Perovskite Cathode: $(La_{0.9}Sr_{0.1})$ $(Cr_{0.85}Co_{0.05}Fe_{0.05}Ni_{0.05})O_3$", R.K. Gupta and C.M. Whang, presented at the Mater. Res. Soc., Korea, Spring Symp. May 19-20, 2006, Jinju, Korea.
- Achieved **Best Paper Award** for paper entitled "Sol-Gel Synthesis and Structural Study on novel IT-SOFC Perovskite Cathode: $(La_{1-x}Sr_x)$ $(Cr_{0.85}Co_{0.05}Fe_{0.05}Ni_{0.05})O_3$", R.K. Gupta and C.M. Whang, presented at the IUMRS-ICA-2006, Sept. 10-14, 2006, Jeju, Korea.
- Achieved **Best Poster Award** for paper entitled "Phase evolution, structure, oxygen stoichiometry, micro-structure and electrical property of perovskite-type cathodes, $(La_{0.75}Sr_{0.25})(Mn_{0.95-x}M_xNi_{0.05})O_{3+\delta}$, where x = 0.1 - 0.3 mole, and M = Fe or Co", R.K. Gupta, presented at the Yonsei University Brain Korea Seminar, Jan. 15, 2008, Seoul, Korea.

Computer Skill

- Passed Diploma in Computer Programming (Part-time) from the Pandit Ravishankar Shukla University, Raipur, India. Diploma awarded, 10 Nov. 1993
- Well acquainted with Windows-based operating systems.
- Well acquainted with MS Office and various research-based software.

Personal Profile

Sex: Male **Date of Birth**: March 23, 1969 **Father's Name:** Jagannath Prasad Gupta

Nationality: Indian **Marital Status**: Married with Dr. Santosh Rani Agrawal **Children**: 2

Address

Home: Villa 40, Near Madarsa Kube, Wadi Mabayid Street, Um Al Hamam, Riyadh 11556 , **Saudi Arabia** **Mobile**: +966-592111940

Permanent: S/o Late Shri J. P. Gupta, Beauty Palace, Hatari Choak, Chandrapur – 495692, CG, **India** **Mobile**: +91-9098165222; +91-9685209331

Teaching Statement

Experience

UG Level, 7.2 years; PG Level, 2.25 years. **Total: 9.4 years**

Teaching Area/ Interest

Mechanics and Heat; Electricity and Magnetism; Geometrical Optics; Physical Optics; Clinical Visual Optics; Solid State Physics; Statistical Physics; Electronics; Laser Physics; Engineering Physics; Electrochemical Power Sources; Photovoltaic Sources; Renewable Energy.

Teaching Philosophy

- My basic educational approach
  Being an Indian and grown with a healthy "Guru- Shishya Parampara", the excellent relation between the student and teacher, I follow the Indian tradition of teaching and interaction with the students. This has been creating a healthy teaching and research atmosphere and resulting in good performance by students. I also use the modern teaching aids and introduce the latest trend of the research work to make my students up-to-date.
- How I work with the development of student learning
  A student learns very fast if the topic is interesting and related with his goal. A presentation using pictures, videos, and simulations helps to increase the subject understanding. Therefore, while preparing a PPT file for lecture, I use pictures, diagrams, simulations, etc. to explain the subject. I always correlate the topic with the student's objective.
- How I work with the development of my own learning
  Learning is a lifelong process. Self-learning is required for a teacher/ research scholar for updating himself as per the society/ scientific need. I keep myself updated using literature survey through the Web of Science and the SciFinder. I use Endnote to store the searched data. I also use pdf files for reading.
- How I contribute to the organizational development of my institution
  An educational institute can be improved by hiring teachers, who are good in both teaching and research. The research helps to develop state-of-the-art devices for the society and brings funding in the Institution. Students learn new techniques and get hired by companies. As mentioned earlier, teaching helps a student to learn a topic fast. Because of my teaching capability and energy-based research experience, I will be able to fetch funding easily and produce energy-based skilled students.
- I have knowledge of contemporary teaching practices and experience in testing/ assessment, quality assurance and standards for accreditation, e-learning, and curriculum/ materials design and development.

Developed Course Curriculum

- Statistical physics and Solid state physics at the Dept. of Applied Physics, Debub University, Awassa, Ethiopia
- Geometric optics, Physical optics and Clinical visual optics as per NCAAA at Dept. of Optometry, King Saud Univ., Riyadh, Saudi Arabia.

Courses Taught

- **Saudi Arabia**, Riyadh: **King Saud University**, Dept. of Optometry; Optometry Doctor (4 years OD Program). Duration: 09/2013 – 05/2019.
  - **Geometrical Optics (Opto221)**: Geometric methods as applied to refractive and reflecting surfaces, thin and thick lens systems, magnification and prism properties of lenses.
  - **Clinical Visual Optics (Opto223)**: A review of general and physical optics, optical properties of the eye, image quality, schematic and reduced eyes, optics of the cyclopean eye, measurement of parameters of the eye, accommodation, retinal image size, refractive errors, visual axes, Euclidean and non-Euclidean space, Pulfrich phenomenon, spherical ametropia as related to spectacle and relative spectacle magnification, ocular catoptrics and entopic phenomena.
  - **Physical Optics and Photometry (Opto311)**: Principles and clinical applications of apertures and stops, basic photometric concepts, measurement of light levels, applications in ergonomics, diffraction, interference, polarization, birefringence and lasers.
  - **Developed lab experiments including teaching materials for OPTO 221 and OPTO 311**
  - **Research Project (Opto475/Opto498/Opto499)** for the final year students.
- **Ethiopia**, Awassa: **Debub University**, Dept. of Applied Physics; Bachelor of Science (4 years Degree Program). Duration: 11/2003−07/2005.

- **Mechanics and Heat (Phys201):** Vectors, Kinematics of a particle, Dynamics of a particle, Work and energy, Dynamics of systems of particles, Rigid body motion, Oscillatory motion, Gravitation, Fluid mechanics, Waves, Heat and thermodynamics.
- **Electricity and Magnetism (Phys202):** Electric fields, Electric potential, Capacitance and Dielectrics, Electric circuits, Magnetic field, Electromagnetic induction, Magnetic materials, Circuits with varying current, EM waves and Maxwell's equations, Light.
- **Phys211** (**Lab Experiments**) based on Mechanics and Heat.
- **Statistical Physics (Phys322):** Review of the laws of thermodynamics, Thermodynamic potentials, Conditions for equilibrium and stability, Legendre transformations, Maxwell relations, Phase transitions, Quantum statistics, System of interacting particles, Kinetic theory of transport processes.
- **Solid State Physics-I (Phys451):** Crystal structure, X-ray diffraction, Classification of crystals and binding energy, Thermal properties of solids, Dielectric properties of solids and phase transitions, Dia-, para- and ferro- magnetism.
- **Solid State Physics-II (Phys452):** Free electron Fermi gas, Energy bands, Semiconductor crystals, Superconductivity, Point defects
- **Senior Research Projects (Phys492)** by a 4^{th} year student on a selected topic in physics.

· **India**, Raipur: **Pandit Ravi Shankar Shukla University**, School of Studies in Physics; Master of Science (2 years PG Program). Duration: 08/1997−04/2000 and 08/2003−11/2003

- **Solid State Physics:** Crystal structure, X-ray diffraction, Classification of crystals and binding energy, Thermal properties of solids, Dielectric properties of solids and phase transitions, Dia-, para- and ferro- magnetism, Free electron fermi gas, Energy bands, Semiconductor crystals, Point defects.
- **Electronics:** Energy bands in solids, Transport phenomena in semiconductors, Junction-diode characteristics, Diode circuits, Transistor characteristics, Digital circuits, Transistor at low frequencies, Transistor bias and Thermal stabilization, Transistor at high frequencies, Multistage amplifiers, Feedback amplifiers, Stability and Oscillators, Operational amplifiers.
- **Laser Physics:** Population inversion, Laser pumping, Resonators - Vibrational modes of resonators, number of modes/unit volume - Open resonators, Control resonators, Q Factor, Losses in the cavity, Threshold condition, Quantum yield; Ruby Laser – three level system, Pumping power, CaF_2 laser, four level laser, Neodymium laser - Nd:YAG; Applications of Lasers in Industry, Medicine & Communication.
- **Lab Experiments:** Based on Solid State Physics and Electronics.

· **India**, Raipur: **Raipur Institute of Technology**, Dept. of Physics; Bachelor of Engineering (4 years Degree Program). Duration: 02/1997-08/1997

- **Engineering Physics**: Semiconducting materials, Dielectric materials, Magnetic materials, Superconducting materials.
- **Lab Experiments**

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http://fac.ksu.edu.sa/rgupta/home

Research Statement

Experience

Pre-PhD: 1 year; PhD: 5.2 years; **Postdoctoral**: 20.3 years; **Total**: 26.5 years

Research Area/ Interest

Solid Electrolytes and Electrodes for Renewable Energy Sources and Batteries; Nano-particles for Energy Application.

Key Skills

Ionic conductivity, interfacial resistance, capacitance, and dielectric constant by impedance spectroscopy; electrical conductivity by van der Pauw four-probe dc method; ionic mobility by Transient ionic current technique; ionic transference number and ionic drift velocity by dc polarization technique; thermoelectric power by Differential method; structural parameters, such as lattice parameters, volume, bond length, and bond angle using Rietveld analysis of the XRD pattern; structural analysis of the FT-IR and Raman spectra through OPUS software; thermal properties using DTA, DSC, and TGA; thermal expansion using Dilatometry; Brunauer-Emmett-Teller (BET) surface area; pore size and volume by Archimedes' principle; porosity using Pycnometry; Microstructure using SEM; transmittance/ absorption of polymeric film using UV-visible spectrophotometry; battery property; compressive strength using Universal Tester; thickness and camber measurements using surface profilometry; photovoltaic properties; Nanosecond laser flash photolysis spectroscopy.

Research Projects Involved In

- **Principal Investigator/ Scientist**
  - National plan for science and technology (**NPST**), KSU, Saudi Arabia with Dr Bedja and Dr Khan; Towards all-solid-state dye-sensitized solar cells using Co(II/III) redox couple-based solid polymer electrolytes (Project No. 13-ENE886-2, March' 2013; Two years**.** (No Funding due to Economic fall)
  - Department of Science & Technology (**DST**), New Delhi, India (Fast-track Young Scientist Project); "Li^+ ion conducting polymer electrolytes batteries"; May' 2003–May' 2006 (Withdrawn).
  - Council of Scientific & Industrial Research (**CSIR**), New Delhi, India (Research Associateship Project); Ag^+-based solid electrolytes for battery application; Oct.'1997–Nov.'2001. (Completed)
- **Co-Investigator/ Postdoctoral Fellow**
  - Dr Bedja (KSU) and Dr Gamal (KSU). Dye-sensitized Solar Cells; Deanship of Scientific Research (**DSR**), KSU, Saudi Arabia. May' 2013–May' 2015. (Completed)
  - Dr. I. Bedja, King Saud Univ., Riyadh, Saudi Arabia; Prof. C.M. Whang, Inha Univ., Incheon, Korea; Lithium Power Technologies, Inc., Manvel, USA; Prof. R.C. Agrawal, Pt. R. S. S. Univ., Raipur, India.

Accomplishments

- **Silicon nano-particles** synthesis using electrochemical etching of Si-wafer. We recently showed for the first time that Si-nanoparticles film coated on top of the DSSC works as UV to visible light converter and anti-reflector, and thus improves the cell efficiency. (King Saud Univ., Riyadh)
- **Dye-Sensitized Solar Cells (DSSCs): I am working currently on redox-mediators for DSSC application.** Till now, I have synthesized highly conducting poly(ethylene oxide)-succinonitrile blend-, pure succinonitrile- and poly(ethylene oxide)-tetramethyl succinonitrile blend-based electrolytes. The blending largely reduced the poly(ethylene oxide) crystallinity and improved the interfacial contact between dye-sensitized TiO_2 and electrolyte, and thus the cell efficiency. (King Saud Univ, Riyadh; Sogang Univ., Seoul)

  I was also involved in nanosecond laser flash photolysis spectroscopy study of newly synthesized dyes with a group based on NIMS (Japan), IICT (India), and North Carolina State University (USA).
- **Solid Oxide Fuel Cell (SOFC) Materials** (Inha University, Incheon; Yonsei Univ., Seoul)

  Current collectors: The $La_{0.8}Sr_{0.2}CrO_{3-d}$ coated stainless-steel mesh was developed to reduce the manufacturing cost. $La_{0.6}Sr_{0.4}\,Co_{0.2}Fe_{0.8}O_3$ (LSCF) ceramic foams were also developed with improved mechanical property.

  Cathode materials: A conventional perovskite-type cathode system, $La_{1-x}Sr_x\,MnO_{3+d}$ (LSM) was co-doped with divalent ions, such as Fe^{2+}, Co^{2+} and Ni^{2+}. The co-doping largely improved the ionic conductivity and interfacial polarization resistance of the LSM at the intermediate-temperature range, while retaining the structural, thermal, and micro-structural properties.

  Anode/ electrolyte multi-layer: I developed a low cost and in-line lamination procedure using the uni-axial pressing and produced almost flat anode/ electrolyte laminate using the tape-casting method followed by the co-sintering. Electrolyte: YSZ and CGO. Anode: NiO-YSZ and NiO-CGO.

Inter-connecting materials: The conventional inter-connecting material, $La_{0.8}Sr_{0.2}CrO_{3-d}$ was synthesized using various solvents and chelating agents in order to remove a commonly observed impurity phase, $SrCrO_4$. It was shown that the $La_{0.8}Sr_{0.2}CrO_{3-d}$ with the least fraction of $SrCrO_4$ can be obtained using the ethylene glycol and citric acid (the Pechini method). An impurity-free and highly air sinterable $La_{0.8}Sr_{0.2}CrO_{3-d}$ was synthesized via sintering at ~1200°C. In order to further improve the electrical conductivity and air sinterability, $La_{1-x}Sr_x\ CrO_{3-d}$ was partially co-doped with 0.05 mole fraction of Fe^{2+}, Co^{2+}, and Ni^{2+}, respectively. It was also shown that the synthesis using the metal acetate precursors by the Pechini method results in a single-phase perovskite; while, the metal nitrate precursors produce secondary phases along with the perovskite phase.

- **Li^+, Na^+ and Ag^+ ion Conducting Solid Electrolytes for Batteries** (King Saud Univ., Riyadh; Sogang Univ., Seoul; Inha University, Incheon; Lithium Power Technol., USA; Ravishankar Univ., Raipur)

  Ag^+ ion conducting composite and glassy electrolytes with $\sigma_{25°C}$ of ~10^{-3} S cm^{-1} were synthesized using new and alternate host-matrix, a quenched/ annealed 0.75AgI: 0.25AgCl mixed-system/ solid-solution. This consequently led to Ag+ ions-based batteries with improved electrochemical properties. Dispersoids used: Al_2O_3, SnO_2, SiO_2, ZrO_2 and Fe_2O_3. Glass formers used: $\{B_2O_3:MoO_3\}$, MoO_3, WO_3 and P_2O_5.

  A methodology was developed to measure the ionic drift velocity and the results were comparable with those determined using the ionic mobility measurement.

  Li^+ ion conducting glasses, $LiI\text{-}Li_2S\text{-}B_2S_3/\ P_2S_5$ were synthesized using the melt-quenched method. The samples exhibited $\sigma_{25°C}$ of ~5´ 10^{-4} S cm^{-1} at 10 kHz.

  Li^+ ion conducting polymer gel electrolytes were synthesized using commercially-available acrylates and lithium imide salt. The polymeric film was obtained by the Mylar-rod. The cross-linking in polymers was carried using the UV curing. The solvent-free samples exhibited $\sigma_{25°C}$ of ~3.3´ 10^{-5} S cm^{-1} at 10 kHz.

  Li^+ ion conducting organically modified electrolytes (ORMOLYTEs), $(SiO_2\text{-PEG})\text{-}LiCF_3SO_3$ were synthesized using the sol-gel method via the classic and sono-catalysis routes. The ORMOLYTE exhibited $\sigma_{25°C}$ of ~2´ 10^{-4} S cm^{-1}, which is the highest so far for the ORMOLYTEs.

  Li^+ ion conducting solid polymer electrolyte with $\sigma_{25°C}$ of ~5´ 10^{-4} S cm^{-1} was synthesized using poly(ethylene oxide)-succinonitrile blend as a host-matrix.

  Na^+ ion conducing solid polymer electrolyte was synthesized using poly(ethylene oxide) and disodium terephthalate (DST). The DST was derived from the polyethylene terephthalate waste.

- **Cathodes for Li^+ Rechargeable Batteries** (Lithium Power Technol., USA; Yonsei Univ., Seoul)
  Metallized cathode (Al) with conducting graphite, $LiCoO_2$ and PVDF; $Li(Ni_{0.7}Co_{0.3})O_2$; $LiMn_2O_4$.

- **Photo-conductor**: Rhodamine B dye-sensitized La^{3+}-doped ZnO for improving photo-conductivity of ZnO. (Ravishankar Univ., Raipur)

- **Inorganic-Organic Hybrids**: SiO_2-PEG and Cumarin 4 dye doped SiO_2-PDMS. (Inha Univ., Incheon)

- **Dielectrics:** AgI, AgCl, 0.75AgI: 0.25AgCl, PVDF based Polymers, $Ba_5Nb_4O_{15}$. (Ravishankar Univ., Raipur; Lithium Power Technol., USA; Yonsei Univ., Korea)

Methods of Preparation

Electrochemical Etching; Solution Casting; UV Curing; Dip and Spin Coating; Sol-Gel Processing (Traditional, Sono Catalysis, Polymeric-Gel, Pechini); Polymeric Sponge; Slurry coating using Myer rod; Tape-casting; Screen-printing; Spray coating; Solid-state methods (Physical mixing, annealing, and melt-quenching); Coating of metal on polymer film by a Thermal-evaporator; Doctor blade.

Designed Sets-up

Sample holder for Li^+ ion transport parameters; Sample holder for high temperature electrical conductivity measurement; Electro-phoretic deposition (EPD) set-up; Furnace; Electrochemical etching set-up.

Major Equipments Operated

Solartron, HIOKI, and HP impedance analyzers; Graphtec x-y-t recorder; Glove boxes; Thermal-evaporator; High voltage power source; Keithley source meter; FT-IR spectrometers; X-ray diffractometer (Regaku); Ultrasonic processor; Pycnometer; JASCO UV-visible spectrometer; Nikon Polarized Optical microscope; TA Differential Scanning Calorimeter; TA Thermogravimetric Analysis; Tape-caster; Spin coater; Dip coater; IVIVMSTAT Electrochemical Interface coupled with Newport Solar Simulator; I-V and IPCE measurement systems (PV Measurement Inc., USA); Laser flash photolysis spectrometer (LP920, UK).

Conferences/ Workshops Participated (23)

1. Workshop on Solid State Ionics, Banaras Hindu University, Varanasi, **India**, Nov. 2-8, 1992.
2. 3rd Asian Conference on Solid State Ionics, Varanasi, **India**, Nov. 9-13, **1992**. Paper presented: Solid state battery using all halide glassy electrolyte: 0.45AgI: 0.35AgCl: 0.2CsCl.
3. 81st Indian Science Congress, Jaipur, **India**, Jan. 3-8, 1994. Paper presented: Battery discharge characteristics and transference number studies of 0.7[0.75AgI: 0.25AgCl]: 0.3Al_2O_3. (**ISCA-94 Young Scientist Contest**)
4. 1st National Conference on Solid State Ionics, Amritsar, **India**, Feb. 14-16, 1994. Paper presented: [0.75AgI: 0.25AgCl] quenched system: A better choice as host compound in place of AgI to prepare Ag^+ ion conducting superionic glasses and composites.
5. 82nd Indian Science Congress, Calcutta, **India**, Jan.3-8, 1995. Paper presented: A new fast Ag^+ ion conducting composite electrolyte system: Solid state battery and thermoelectric power studies. (**ISCA-95 Young Scientist Contest**)
6. 2nd National Conference on Solid State Ionics, Madras, **India**, Feb. 15-17, 1996. Paper presented: Transport property studies on some new Ag^+ ion conducting superionic solids.
7. 5th Asian Conference on Solid State Ionics, Kandy, **Sri Lanka**, Dec. 2-7, 1996. Papers presented: Thermoelectric power study on a new Ag^+ ion conducting composite electrolyte system: (1-x)[0.75AgI: 0.25AgCl]: $xSnO_2$
8. 3rd National Conference on Solid State Ionics, Itanagar, **India**, March 23-26, 1998. Papers presented: Polarisation/self-depolarization studies on Ag^+ ion conducting quenched [0.75AgI:0.25AgCl] mixed-system/solid-solution.
9. National Conference on Science & Technology of Exotic Materials, Bhopal, **India**, June 5-6, 1998. Paper presented: Estimation of mobile ion concentration in Ag^+ ion conducting AgI by dc polarization/ depolarization studies.
10. 6th Asian Conference on Solid State Ionics, Suraj Kund, New Delhi, **India**, Nov. 29 - Dec. 4, 1998. Papers presented: Thermoelectric power and battery discharge characteristic studies on a new silver ion conducting composite electrolyte system.
11. WRIC Workshop on Maintenance of Laboratory Equipment, Pandit Ravishankar Shukla University, Raipur, **India**, Nov. 5 - 10, 2001.
12. 8th Asian Conference on Solid State Ionics, Langkawi, **Malaysia**, Dec. 15-19, 2002. Paper presented: Electrical and structural properties of new Li^+ ion conducting sol-gel derived ormolytes: (SiO_2-PEG)-$LiCF_3SO_3$.
13. Materials Research Society, Korea, Spring Symp. Jinju, **Korea**, May 19-20, 2006. Papers presented: XRD Analysis of Sol-Gel Derived Novel SOFC Perovskite Cathode: $(La_{0.9}Sr_{0.1})(Cr_{0.85}Co_{0.05}Fe_{0.05}Ni_{0.05})O_3$ (**Recipient of Best Poster Award)**
14. IUMRS-ICA-2006, Jeju, **Korea**, Sept. 10-14, 2006. Papers presented: (i) Sol-Gel Synthesis and Structural Study on novel IT-SOFC Perovskite Cathode: $(La_{1-x}Sr_x)(Cr_{0.85}Co_{0.05}Fe_{0.05}Ni_{0.05})O_3$ (**Recipient of Best Paper Award**); (ii) Investigation on Electronic Conducting Ceramic Foams as SOFC Current Collectors.
15. 2nd International Workshop on Nanostructured Materials, Inha University, Incheon, **Korea**, June 15, 2007. Paper presented: Anionic effect on synthesis of new doped $LaMO_{3-d}$ (M = Cr, Mn) perovskites for solid oxide fuel cell applications. (**Invited Talk**)
16. Yonsei University Brain Korea Seminar, Jan. 15, 2008, Seoul, Korea. Paper presented: Phase evolution, structure, oxygen stoichiometry, micro-structure and electrical property of perovskite-type cathodes, $(La_{0.75}Sr_{0.25})(Mn_{0.95-x}M_xNi_{0.05})O_{3+\delta}$, where *x* = 0.1 - 0.3 mole, and M = Fe or Co. (**Recipient of Best Poster Award)**
17. Korea Society of New and Renewable Energy 2008, Daegue, **Korea**, May 22-23, 2008. Paper presented: Structural, micro-structural and electrical properties of perovskite-type cathodes, $(La_{0.75}Sr_{0.25})$ $(Mn_{0.85}M_{0.1}Ni_{0.05})$ $O_{3+\delta}$, M = Fe and Co, for intermediate-temperature solid oxide fuel cell application
18. 18th International Conference on Photochemical Conversion and Storage of Solar Energy (IPS-18), Seoul, **Korea**, July 25~30, 2010. Paper presented: Poly(ethylene oxide): succinonitrile− A new polymeric matrix of solid electrolytes for dye-sensitized solar cells**.**
19. 1st International Conference on Tap Sun: The Sustainable Future (ICTAPSUN – 2011), Hyderabad, **India**, November 25-26, 2011. Paper presented: Electrical and photovoltaic properties of blend-based solid polymer electrolytes.
20. Workshop on "Effective Use of Spectroscopy" organized by King Saud University, Riyadh, **Saudi Arabia**, April 4, 2012.
21. 2nd Saudi Association of Optometry Conference (SAO2013), Riyadh, **Saudi Arabia**, November 25-27, 2013. Paper presented: Contact Lenses – Materials Aspect.
22. 14th Asian Conference on Solid State Ionics (ACSSI-2014), **Singapore**, June 24-27, 2014. Paper presented: Electrical, structural, optical and thermal properties of (1-*x*)blend: *x*Li[$(CF_3SO_2)_2N$] solid polymer electrolyte system.
23. 14th International Union of Materials Research Societies-International Conference on Advanced Materials (IUMRS-ICAM 2015), Jeju, **Korea**, October 25-29, 2015. Paper presented: Electrical and photovoltaic properties of poly(ethylene oxide)-succinonitrile blend-based redox-couple solid polymer electrolytes.

List of Publications

In Journals

1. Utilization of polyethylene terephthalate waste for preparing disodium terephthalate and Its application in a solid polymer electrolyte, N. Haq, F. Shakeel, F.K. Alanazi, H. Shaikh, I. Bedja, *R. K. Gupta*, Journal of Applied Polymer Science 136 (**2019**) 47612. DOI: 10.1002/app.47612
2. Electrical, structural, and thermal properties of succinonitrile-LiI-I_2 redox-mediator, *R. K. Gupta*, I. Bedja, A Islam, H. Shaikh, Solid State Ionics 326 (**2018**) 166-172. DOI: 10.1016/j.ssi.2018.10.008
3. Cationic effect on dye-sensitized solar cell properties using electrochemical impedance and transient absorption spectroscopy techniques, *R. K. Gupta*, I. Bedja, Journal of Physics D-Applied Physics 50 (**2017**) 245501. DOI: 10.1088/1361-6463/aa6fa3
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