Research and Academic Contributions

Collaborations with Research Centers

1. Prof. Ravindra Pandey, Chair, Department of Physics, Michigan Technological University, Houghton, Michigan, USA.
2. Dr. Manickam Minakshi, Faculty of Science and Engineering, School of Engineering and Information Technology, Murdoch University, Murdoch, Australia.
3. Dr. Jeevan Jyoti Nakarmi, Department of Physics, Tribhuvan University, Kathmandu, Nepal.

Conference/ Seminar/Workshop Organized

1. "*IWMMS 2013: International Workshop on Materials Modeling and Simulation*" with the collaboration of Department of Applied Physics, Michigan Technological University, Houghton, USA, during June 24-27, 2013 at Shri Shankaracharya Group of Institutions, Junwani, Bhilai.
2. *A National Conference on recent advances in nanoscience and nanotechnology*, SSCET-Junwani, Bhilai, on 12-13 Jan 2009.
3. A national conference on " *Horizons of electrolytic, electronic and photonic material Physics*" SSCET- Junwani, Bhilai, on 26-27 Oct. 2007.
4. A workshop on "*Innovative Physics Teaching (WIPT 2006)*" on 30th December 2006 in SSCET, Junwani Bhilai. Resource person, Dr. H. C. Verma, Deptt. of Physics I.I.T., Kanpur, U.P.
5. A seminar on "*Role of Physics in Technical Education*" in the occasion of National Science Day 2005 and International Physics Year 2005 in SSCET Junwani Bhilai, 19 April 2005.

Achievements:

- Established a **Condensed Matter Physics Research Lab (CMPRL)** in 2001-2002 for research work in thin films, solid electrolytes and its device applications as well as nano-materials.
- Established **Computational nanoionics Research Lab (CNIRL)** in 2013 for

material/nano-material modeling and simulation to study electronic, electrical, mechanical, optical and transport properties of nano-particles, nano-tubes, nano-ribbons, semiconductors and conducting polymers. This is the first parallel computing lab of central India which is collaborated with the Department of Physics, Michigan Technological University (MTU), Houghton, USA.

- Establishing a **Siesta research group** in India as *siesta-india* to work together in the field of nano- material science to study properties and device applications. In this group free online training/discussions sessions will be encouraged to learn and study different material properties. The main aim of this group is to work together and learn together. Interested candidates may contact either through mail or in my site: www.drmlv.in/siesta-india. M.Sc/MTech students are also welcome with some innovative ideas/problems.
- Reviewer of various international Journal viz : Journal of Ionics, Journal of Material Science and Engineering-B, Journal of Alloys and Compounds, Journal of material research etc.
- Delivered a series of lectures on "Piezoelectric materials and optoelectronic devices" from 13th – 15th November 2006 at Govt. V. Y. T. P. G. Autonomous College, Durg(C.G.).
- Attended the Transit of Venus: Training Programme for Master Resource Persons of Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand and Orissa is being organised from 14-15th May, 2012 at M.P. Council of Science & Technology, Vigyan Bhawan, Nehru Nagar, Bhopal-462003 in joint collaboration of NCSTC, DST, New Delhi, MPCOST, Bhopal and Vigyan Prasar, Noida from Chhattisgarh state (Chhattisgarh Council of Science and Technology), I am nominated to participate in this programme.
- Deputed by Chhattisgarh Council of Science and Technology as state level resource person to participate in the National Orientation Workshop for finalization of activity guide of National Children's Science Congress 2012-13 from 11-13 June 2012 at regional institute of education (NCERT) Mysore Karnataka . The focal theme selected by NCSTC -Department of Science and Technology (DST) is "Energy : Explore, Harness & Conserve.

Research Interest

1. **Nanocomposite Materials**: Material Preparation and characterization studies and solid-state electrochemical device applications viz. Solid state batteries. Supercapacitor, light emitting elechrochemical cell of ionic composites, nano-composites, ionic polymers and polymer nano-composite electrolyte materials.
2. **Material-Modeling**: Mathematical modeling and evaluation of transport properties of some ionic/superionic solids by using space charge depolarization method. Modeling of electrochemical devices, solid state batteries, super capacitors and sensors are also in progress.
3. **Image processing of SEM/TEM Images**: Study of surface as well as internal structure of nanocomposite electrolyte systems by digital image processing of their SEM images. One Java based software Image J is being used.
4. **DFT based first principle studies : M**olecular structure, electronic/electrical, mechanical and optical properties using density functional based approach of ionic/super-ionic solids and electronic/ionic conducting polymers SIESTA /transiesta
   a quantum chemistry software and visualization softwares viz. Jmol, Avogadro, Molden, Xcrysden, xmgrace, gnuplot, VESTA.
5. **Molecular mechanics and Molecular dynamic simulation** of polymer
   nano-composite electrolytes for solid state battery, super capacitor, OLED, LEEC applications.

Additional qualifications

Knowledge of MS Office, Dos, windows and Linux operating Systems (FEDORA 16 and Centos 6.4), working knowledge of Modeling packages viz. MATLAB, SIESTA, Transiesta, Jmol, Avogadro, Molden, Xcrysden, xmgrace, gnuplot, VESTA and Java based Image J.