

MOHAMMAD HUSSAIN. K. RABINAL



1. Address for Correspondence

Dr. M.K. Rabinal
Solid State Physics
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Permanent Address

Dr. M.K. Rabinal
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2. Personal

Sex and Marital Status:	Male, Married with three children
Age and Date of Birth:	58 Years, 1 st June 1963
Nationality:	Indian
Religion:	Muslim

3. Academic Records

- B.Sc.:** Physics major, Chemistry and Mathematics minors, 1986, 1st class, *Karnatak University, Dharwad, INDIA.*
- M.Sc.:** Solid State Physics as a specialization, 1988, 1st class with Distinction, *Karnatak University, Dharwad, INDIA.*
- Ph.D.:** Dept. of Physics, *Indian Institute of Science, Bangalore, INDIA*, June 1994, under the guidance of *Prof. E.S.R. Gopal.*
- Research Associate:** Dept. of Physics, *Indian Institute of Science, Bangalore, INDIA* from Nov. 1993-May 1995, with *Prof. E.S.R. Gopal.*
- Postdoc:** Dept. of Materials and Interfaces, *Weizmann Institute of Science, Rehovot, Israel*, from May 1995-December 1996, with *Prof. David Cahen.*
- Lecturer:** SECAB's AIRS Degree College, Bijapur, Karnataka. From December 1996-June 1997.
- Postdoc:** Solid State Electronics, *Tata Institute of Fundamental Research, Mumbai, INDIA*, from July 1997-March 1999, with *Prof. K.L. Narasimhan.*

Lecturer: Solid State Physics, Department of Physics, *Karnatak University, Dharwad, Karnataka State, INDIA*, from March 1999 onwards.

Postdoc: *Center for Molecular and Nanoscale Electronics, School of Engineering, University of Durham, UK, Commonwealth Fellowship* 2002-2003, with *Prof. Mike Petty*.

Reader: Solid State Physics, Department of Physics, *Karnatak University, Dharwad, Karnataka State, INDIA*, on 2008.

Associate Professor: Condensed Matter Physics, Department of Physics, *Karnatak University, Dharwad, Karnataka State, INDIA*, from 2011.

Professor: Condensed Matter Physics, Department of Physics, *Karnatak University, Dharwad, Karnataka State, INDIA*, from 2014.

4. Awards/Fellowships/Recognition

- i).** Total *Citation Index (as on today): 1011*
- ii).** Research Associate, Dept. of Physics, Indian Institute of Science, Bangalore: 1994-95.
- iii).** Postdoctoral Fellow, Dept. of Materials & Interfaces, The Weizmann Institute of Science, Rhovot, Israel: 1995-97.
- iv).** Postdoctoral Fellow, Dept. of Condensed Matter Physics & Materials Science, Tata Institute of Fundamental Research, Mumbai: 1997-99.
- v).** Commonwealth Scholarship, UK, at the Center for Molecular and Nanoscale Electronics, University of Durham, UK: 2002-2003.
- vi).** The best research publication of the year 2010 award for the publication titled “Ambient synthesis and characterization of high quality CdSe quantum dots by an aqueous route” (Langmuir 25 (21), 12729 (2009)) from the Vision Group of Science and Technology, Government of Karnataka.
- vii).** Sir C.V. Raman State Government Young Scientist Award in Physical Science, awarded in the Year 2013 (Karnataka State Council for Science and Technology) for significant contribution in physical science.
- viii).** The research work in the field of bioconjugated CdS nanoparticles synthesis has been highlighted by the prestigious publishing house “Nature”.

5. Title of Ph.D. Thesis:

Investigations on the p-to n-type Conduction Reversal in Chalcogenide Ge-Se-X (X=Bi, Pb, In) Glasses

6. References

Prof. K.L. Narasimhan

Solid State Electronics
Tata Institute of Fundamental Research
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Prof. Mike Petty

Co-Director
Center for Molecular & Nanoscale
Electronics, School of Engineering,
University of Durham, Durham, UK
e-mail: m.c.petty@durham.ac.uk
Fax: 0911-374-2389

7. Brief Summary of Ph.D. Work:

Intrinsic disorder in amorphous semiconductors does not permit the chemical doping to alter the charge carriers, as a result the use of these materials in device applications becomes quite limited. The observation of p- to n-type conduction change in Ge-Se-Bi (Pb) glassy semiconductors created a special interest. Results of detailed investigations on these materials led to propose that microscopic inhomogeneity is the origin for conduction change in these materials. We aimed to study phase separation in Ge-Se-X (X=Bi,Pb,In) compositions by thermal and X-ray structural investigations. Our results clearly show that these materials are microscopically inhomogeneous and the above phenomenon of conduction change can be explained in the framework of chemical and mechanical thresholds.

8. Post Doctoral Work:

1. At the Weizmann Institute of Science, Israel

i). Transition Ion Drift Measurements:

The existence of Space Charge Region at the interface of p-n/Schottky junction can be explored to measure the diffusion coefficient of mobile ionic impurities by probing transient capacitance. We applied this method to measure diffusion coefficient of Cu in CuInSe₂, Li and Ag in CdTe and HgCdTe single crystals, which are important photovoltaic materials. Our measured results are in close agreement with reported ones. Hence, the technique is simple, reliable and non-destructive to characterize ionic mobility in semiconductors.

ii). Ohmic Contacts to p-CdTe and p-CuInSe₂:

Forming a good ohmic contact to these semiconductors remained a major challenge. The low-level p-type doping and complex defect chemistry of these materials never permitted to form better ohmic contacts. We propose a simple room

temperature electrochemical technique to form stable, low resistance and high current density ohmic contacts to p-CdTe and p-CuInSe₂ single crystals by electro-diffusion of Hg ions prior to metal contact.

2. At the Tata Institute of Fundamental Research, Bombay, India

Meyer-Neldel Rule in Amorphous Silicon:

Meyer-Neldel (MN) rule relates dc conductivity pre-factor to activation energy. Different mechanisms have been proposed to explain the origin of MN-rule in semiconductors, of these structural inhomogeneties, temperature dependence Fermi-level shift are prominent ones. Earlier studies on MN-rule were invariably affected the Density of States (DOS) in amorphous silicon. We studied MN-rule in (n⁺-i-n⁺) amorphous Si without affecting DOS by low intensity photoconductivity measurements to show that the statistical shift of Fermi-level is the cause of MN-rule in amorphous silicon.

3. At Centre for Molecular and Nanoscale Electronics, University of Durham, UK

Organic Light Emitting Diodes:

The work involves the design and development of semiconducting organic molecules to have a balanced charge transport so that efficient organic light emitting diodes could be realized. In this respect organic molecule like tri-phenylamine -oxadiazole-fluorene triad was synthesized and all solution based multilayer light emitting diodes were fabricated by spin coating and systematically studied for their electroluminescent properties. To support the results DFT calculations were performed to estimate HUMO-LUMO levels and other parameters. The external quantum efficiency (EQE) close to 0.36% has been observed. The emitted light from these devices varied from light blue through to green by the systematic chemical modification of the molecular subunits.

4. Current Research Areas at Karnatak University, Dharwad

- a) **Molecular Electronics:** In recent time, the molecular electronics, that involves binding of organic molecules between two electrodes for charge transport measurements, has become an important field to push miniaturization of electronics down to nano-regime. Presently we have been studying the class of organic molecules on silicon surface to constitute metal-molecules-silicon junction to understand the charge transport through such junctions in order to understand the role of dipole-moment, conjugation and length of molecules. Such interfaces can be an interesting class of nanoscale materials for wide range of electronic devices and sensors.

- b) ***Bio/Biologically Conjugated Structures for Electronic Devices:*** The deoxyribonucleic acid (DNA) is a highly functional, versatile and genetically coded bio-molecule. It may provide a unique platform to constitute the new generation electronic devices with unexplored physics and chemistry. In the present work, we have been trying to constitute electronic junctions using DNA, its functionalized molecules and also its interfaces with certain active nanomaterials, such as PbS, PbSe and PbTe, to understand the charge transport mechanism so that a new generation electronics can be realized.
- c) **Quantum Dots for Photovoltaic Devices:** Different semiconductor nanoparticles have been prepared to implement them for low-cost solar cells. Zinc oxide infused with certain visible active dyes by simple electrochemical route that is anodic dissolution of zinc is prepared. These composites are highly stable and those will be implemented to develop electrochemical photovoltaic cells.
- d) **Chemical Bath Deposition of Quantum Dots:** The chemical bath deposition is the simplest and oldest method of direct deposition of semiconductor films. We successfully deposited various materials such as CdS, CdS-dye composites, Ag₂S and Cu₂S etc. as low cost photovoltaic materials. We are in the process to put these materials to make heterojunction solar cells.
- e) **Carbon and Metal Based Materials for Supercapacitors:** Different films of graphene and metals (particularly copper and aluminum) are prepared as porous and flexible materials by simple routes, like self-assembly and electrochemical, to implement them to constitute symmetric and asymmetric supercapacitors. The electrochemical characterization of these with different electrolytes exhibit high specific capacitance that is evident from our recent research.
- f) **Graphene-Metal Nanocomposites for Memory Devices:** Various metal nanoparticles are loaded with reduced graphene that is prepared by solution route chemistry. Then they are subjected to memory-resistor (memristor) applications by sandwiching between two suitable electrodes. Attempts are being made to design both mono and bistable junctions by proper control of compositions of these composites.
- g) **Nanoparticle Composites of Low Band Gap Semiconductor for Thermoelectric Applications:** Low band gap semiconductors like Cu₂S, Bi₂S₃, BiTe, PbTe etc. are active thermoelectric materials for energy conversions. Presently we are synthesizing nanoparticles of these semiconductors to design thermoelectric junctions. The nano-phase of these materials can provide

“electron-lattice and phonon- glass” phases that is an essential requirement for high thermoelectric efficiency. Our work aims to implement these materials for solar-to-thermal-to-electric energy conversion.

h) **Metal Air Batteries**

There is a continuous struggle develop the cheaper, denser, lighter and more powerful batteries due to various issues. The present electronics gadget batteries, particularly Li-ion batteries, demands inert atmosphere for their fabrication and application due to a high reactivity of its components. Recently there is paradigm shift towards metal air batteries which overcome the above difficulties. Particularly the Aluminum and Zinc air batteries are gaining more importance; still the research on these is in its infancy state. The inclusion of nanomaterials for the development of these batteries has brought a lot of hopes to see them as a potential contender for Li-ion and other existing batteries. Here the proposed work will be focused to eliminate the Zn metal dendritic growth that happens during the charging/ discharging cycles of these devices. This has been approached through the molecular grafting Zn electrodes by certain organic molecule and then deposition of Zn nanoparticles as active materials for metal air-batteries.

9. **Research Projects:**

- i. **The Coordinator: UGC-SAP-Centre of Advanced Studies Phase-II, Amount Rs 2.65, 00,000/- grant, Dept. of Physics, KUD.**
- ii. **“Development of nanoscale biosensors based on semiconductor quantum dots”, Board of Research in Nuclear Sciences (BRNS), Govt. of India, as Co-Investigator, Amount Rs. 30,00,000/-**
- iii. **“Center with Potential for Excellence in Particular Area (CPEPA)”, University Grants Commission (UGC), Govt. of India, as a Research member of the Team, Amount Rs. 6,85,00,000/-.**
- iv. **“Studies of Influence of Organic Molecules on Semiconductor Surfaces and their Devices”:** Supported by *Department of Science and Technology, Govt. of India*, Just Completed. **Amount 22,00,000/-.**

10. **Research Guidance:**

1. **Research Guidance**

PG: M.Sc. Project Work: 99

Ph.D.: Presently Seven students are working for their Ph.D. degree.

Ph.D. Awarded: 10

List with Titles:

- i. ***“Studies on the Influence of Organic Molecules on Semiconductor Surfaces and their Devices”***, Ms. Roopa. K. Hiremath (2007).
- ii. ***“Preparation and Charge Transport Measurements of Thin Films of Molecularly Capped CdS (Se) Nanocrystalline Semiconductors”***, Mr. M.N. Kalasad (2008).
- iii. ***“Molecular Grafting of Silicon Surfaces and their Effect on Silicon-Metal Junctions”***, Mr. I. Mohamad Ikram (2011).
- iv. ***“Optoelectronic Properties of Photovoltaic Active Semiconductors and their Devices”*** by Mrs. Nerle Uma Devi V (2014).
- v. ***“Synthesis and Optoelectronic Properties of Nano-structured Materials”*** by Mrs. Rajeshree M. Hudlur (2015).
- vi. ***“Nanostructured Materials and their Composites for Energy Storage Device Applications”*** by Mr. Shridhar P. Mundinamani (2015).
- vii. ***“Design and Fabrication of Hybrid Nanostructures and their Physical Properties”*** by Mrs. Bindu Sharma (2015).
- viii. ***“Development of Nanostructure Based Thermoelectric Materials for Energy Conversion”*** by Rafiq Mulla (2018).
- ix. ***“Design and Development of Molecular Memristor Junctions”*** by Bahubali. K. Murgunde (2018).
- x. ***“Optical and Photocatalytic Properties of Graphene Based Nanomaterials”*** by Mr. Raghu.M. Gunnagol (2021).

11. Courses Taught and Experience at Post Graduate Studies:

1. ***Condensed Matter Physics***
2. ***Quantum Mechanics***
3. ***Statistical Mechanics***
4. ***Electronics***
5. ***Nanomaterials***
6. ***Practical Courses***

Teaching/Research Experience:

21 Years of Teaching Experience and 30 years of Research

12. Invited Talk

1. ***“Nanoscience: Fundamental to Applied”***, invited talk at National Seminar on Recent Trends in Nanotechnology”, Nehru Arts, Science & Commerce College, Hubli, **8 February, 2020**
2. ***“Research: A Critical Review”***, invited talk at UGC-HRDC, Karnatak University, Dharwad, **“Research Methodology”**, **13 December, 2019.**

3. **“Relook of Raman Effect”**, invited talk at UGC-HRDC, Karnatak University, Dharwad, “Science, Society and Indigenous Research”, **16 March, 2019.**
4. **“Molecule- Semiconductor Coupling: Interesting Interfaces”**, Invited talk at **“National Seminar on Recent Advances in Condensed Matter Physics”**, Gulbarga University, Kallaburagi, **27 March, 2019.**
5. **“Recent Developments in Supercapacitors”**, Invited talk at **“National Seminar on Recent Advances in Condensed Matter Physics”**, Gulbarga University, Kallaburagi, **27 March, 2019.**
6. **“Confluence of Raman Effect and Nanoscience”**, Invited talk at “Current Topics in Condensed Matter Physics”, G. Hallikeri Degree College, Haveri, **28 February, 2019.**
7. **“Biomolecules: A Journey Towards Smart Electronic”**, invited talk at **“International Conference ---“**, Mangalore University, Mangalore, **20 September 2019.**
8. **“Fundamental Aspects of Nanoscience”**, invited talk at “National Seminar”, S.B. Arts & KCP Science College, Vijayapur, **21 February 2019.**
9. **“Nanoscience for Self Cleaning Cloths”** ”, invited talk at “National Seminar”, S.B. Arts & KCP Science College, Vijayapur, **21 February 2019.**
10. **“Electrically Conducting Polymer Composites as Highly Pressure Sensitive Materials”**, invited talk at “International Conference on Direct Digital Manufacturing and Applications”, Karnatak University, Dharwad, **23 February 2019.**
11. **“Recent Developments on Supercapacitors”** invited talk at All India SEV, SDM College of Engineering and Technology, Dharwad, **2 March, 2019.**
12. **“Research: An Essential Curricular in Higher Education”** , invited talk at UGC Orientation Programme on “Research Methodology”, Basaveshwar Science College, Bagalkot, **7 & 8 Sept. 2018.**
13. **“Nanomaterials for Environmental Remedies”**, invited talk at UGC 69th Orientation Programme on “Research Methodology”, Basaveshwar Science College, Bagalkot, **7 & 8 Sept. 2018.**
14. **“Molecular Interfaces: Materials for Modern Electronics”**, invited talk Basaveshwar Science College, Bagalkot, **7 Sept. 2018.**
15. **“Down the Drain: Water Contamination and Possible Solutions”**, invited talk UGC 68th Orientation Program, Human Resource Development Centre, Karnatak University, Dharwad, Karnataka, **9 August 2018.**
16. **“Modern Perspective of Raman Spectroscopy”** invited talk Christ University, Bangalore, Karnataka, **2 June 2018.**
17. **“Modern Perspective of Raman Spectroscopy”**, invited talk, Gulbarga University, Gulbarga, Karnataka, **22 May/2018.**

18. **“Modern Perspective of Raman Effect”**, invited talk, “Two Days Special Lecture Series on Physics” Sponsored by KSCST, Bangalore, Akkamahadevi Women’s University, Vijayapur, **25 March 2018**.
19. **“Fundamental Aspects of Nanoscience”**, invited talk “Two Days Special Lecture Series on Physics” Sponsored by KSCST, Bangalore, Akkamahadevi Women’s University, Vijayapur, **25 March 2018**.
20. **“Plasmonics: Light and Matter Interaction”**, Karnatak University Dharwad, **22 March, 2018**.
21. **“Unification of Raman Effect and Nanomaterials”**, invited talk S.D.M. Engineering College, Dharwad, Karnataka, **28 February 2018**.
22. **“Nanoscience with Emerging Applications”**, invited talk Mahantaswamy First Degree College, Hounsabhavi, Karnataka, **22 February 2018**.
23. **“Writing Research Proposal”**, invited talk at UGC 66th Orientation Programme , Human Resource Development Centre, Karnatak University, Dharwad, Karnataka, **30 January 2018**.
24. **“World’s Energy: Powering from the Sun”**, invited talk at UGC 66th Orientation Program, Human Resource Development Centre, Karnatak University, Dharwad, Karnataka, **30 January 2018**.
25. **“A Glimpse of Nanoscience with Emerging Applications”**, invited talk KCP Science College, Bijapur, **25 September 2017**.
26. **“Nanoparticles and Nanocomposites”**, invited talk National Conference on Particle Accelerators in Interdisciplinary Research, Dept. of Physics, Mangalore University, Mangalore, **11 April 2017**.
27. **“Fundamental Aspects of Nanoscience and Nanotechnology”**, invited talk Faculty Development Programme, P.C. Jabin Science College, Hubballi, Karnataka, **13 March 2017**.
28. **“Molecules on Semiconductor Surfaces: Interfaces for Nanoscale Electronics”**, invited talk Faculty Development Program titled “Recent Advances in Engineering Physics”, RV College of Engineering, Bangalore, **4 March 2017**.
29. **“Introduction to Nanoscience and Nanotechnology”**, invited talk UGC 66th Orientation Program, Human Resource Development Centre, Karnatak University, Dharwad, Karnataka, **3 March 2017**.
30. **29. “Bioelectronics: DNA for Smart Electronics”** invited talk Advanced Nanomaterials/Nanocomposites for Engineering Applications BVB College of Engineering, Hubballi, Karnataka, **1 March 2017**.
31. **“A Glimpse of Nanoscience with Some Applications”**, invited talk KLE GIB College, Nippani, Karnataka, **28 February 2017**.
32. **“Basic Concepts of Solar-Thermoelectric Energy Generator”**, invited talk P.C. Jabin Science College, Hubballi, Karnataka, **18 July 2016**.

33. **“Basic Concept of Solar Thermoelectric Generator”**, invited talk Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **30 April 2016**.
34. **“Nanomaterials for Thermoelectric Applications”** invited talk Dept. of Physics, Mangalore University, Mangalore, Karnataka, **13 October 2015**.
35. **“Competency Based Curriculum in Physics: How to implement it?”**, invited talk Workshop on Curriculum Design, Christ University, Bangalore, Karnataka, **7 October 2015**.
36. **“Prospects of Nano-Assemblies for Solar Energy Conversions”**. invited talk Dept. of Physics, Christ University, Bangalore, Karnataka, **30 June 2015**.
37. **“Fundamentals of Nanomaterials: Energy Applications”**, UGC Sponsored State Level Seminar, Dept. of Physics, Vijayanagar College, Hospet, Karnataka, **17 March 2015**.
38. **“Seminar on the Research Project Proposals”**, invited talk Refresher Course on ICT, Academic Staff College, Karnatak Univesity, Dharwad, Karnataka, **29 December 2014**.
39. **“Energy: A Critical Issue of Modern World”** invited talk Basaveshwar Arts & Science Degree College, Bagalkot, Karnataka, **26 July 2014**.
40. **“Nanomaterials for Environmental Issues”**. invited talk UGC 63rd Orientation programme, Academic Staff College, Karnatak Univesity, Dharwad, Karnataka, **10 July 2014**.
41. **“Environmental Sustainability by Nanomaterials”** invited talk Special Summer School Programme, Academic Staff College, Karnatak Univesity, Dharwad, Karnataka, **19 June 2014**.
42. **“Solar Thermoelectric Generators”**, invited talk 100 KUMSBS Scholarship Training Programme, Karnatak University Dharwad, Karnataka, **29 May 2014**.
43. **“Thermoelectric Generators”**, invited talk Dept. of Physics, Karnataka State Women’s University, Bijapur, Karnataka, **20 May 2014**.
44. **“Nanomaterials: A Possible Solution for Energy and Electronics”** , invited talk Workshop on Advance in Composite and Nano-Materials, B.V. Bhoomaraddi College of Engineering & Technology, Hubli, Karnataka, **10 May 2014**.
45. **“Nanomaterials for Modern Science”** invited talk Dept. of Botany, Karnataka University, Dharwad, **28 March 2014**.
46. **“Can Nanomaterials Help in Converting Solar Energy?”**, invited talk UGC’s Sponsored Two Days Seminar on Trends in Condensed Matter Physics, Dept. of Physics, Karnatak University, Dharwad, Karnataka, **8 March 2014**.
47. **“Powering Planet by Nanomaterials”**, invited talk UGC 62nd Orientation Programme, Academic Staff College, Karnatak University, Dharwad, Karnataka, **4 February 2014**.
48. **“Nano Assemblies for Energy Generation”**, invited talk Lecture Workshop on Physics, KCP Science College, Bijapur, Karnataka, **22 January 2014**.

49. **“Basics of Nanoscience”**, invited talk Lecture Workshop on Physics, KCP Science College, Bijapur, Karnataka, **21 January 2014**.
50. **“Energy Generation from Nano-Assemblies”**, invited talk Workshop on Recent Advances in Thin Film Technology, Dept. of Physics, Basaveshwar Engineering College, Bagalkot, Karnataka, **19 December 2013**.
51. **“Nanotechnology: A Possible Solution for Modern Energy Crisis”**, invited talk Dept. of Physics, Karnatak Science College, Dharwad, Karnataka, **8 October 2013**.
52. **“Nanomaterials: A Possible Solution for Energy and Electronics”**, invited talk Dept. of Electronics & Communication KLE Institute of Technology, Hubli, Karnataka, **10 September 2013**.
53. **“Nanostructures and Molecular Assemblies for Modern Electronics”**, invited talk Workshop on “Quality Enhancement of Teaching for Excellence in Mathematics, Physics and Chemistry”, Vision Group of Science and Technology, Govt. of Karnataka and Rani Channamma University, Belagavi, Karnataka, **10 July 2013**.
54. **“Prospects of Nanostructures and Molecular Assemblies in Modern Electronics”**, invited talk UGC Sponsored National Seminar on “Development in Thin Films Processing and Characterization Technology” Bharati Vidyapeeth, Deemed University, Pune, **8 October 2012**.
55. **“Prospects of Nanostructures and Molecular Assemblies in Modern Electronics”**, invited talk Physics Association Club, Dept. of Physics, Mangalore University, Mangalore, Karnataka, **28 November 2012**.
56. **“Design and Development of Self-Assembled Organic-Inorganic Structures for Low –Cost Photovoltaic Devices”**, invited talk National Workshop on Polymer Solar Cells, Indian Institute of Science Education and Research (IISER), Pune, **21 April 2012**.
57. **“Ceramics Materials”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **29 March 2011**.
58. **“Introduction to Glasses-I”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **29 March 2011**.
59. **“Introduction to Glasses-II”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **30 March 2011**.
60. **“Introduction to General Polymers”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **30 March 2011**.
61. **“Functional Polymers and their Applications”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **31 March 2011**.
62. **“Crystal Growth: Structure and Phase Diagrams”**, invited talk UGC-SAP Lecture Series, Dept. of Physics, Gulbarga University, Gulbarga, Karnataka, **31 March 2011**.

13. List of Publications:

Papers Published in International Journals

No	Publication Details	IF
1	“Significance of Electrode Contact Area on Memristive Parameters of Silver Iodide” , Smita Gajanan Naik and Mohammad Hussain K.Rabinal , Materials Science in Semiconductor Processing, 10.1016/j.mssp.2021.106309. (2022).	3.927
2	“Dopamine Assisted Coral Films of Cobalt as Bi-functional Electrodes for Overall Water Splitting” , Jyothi S. Doddamani, M. K. Rabinal , Energy Technology, 2100264 (2021).	3.6
3	“Melamine assisted large-scale and rapid synthesis of porous copper oxide nanostructures” , Jyothi S. Doddamani, Rajashree M. Hodlur and M. K. Rabinal , Emergent Materials, Doi: 10.1007/s42247-021-00250-1 (2021).	0.64
4	“Rationally Designed Zn-Anode and Co₃O₄-Cathode Nanoelectrocatalysts for an Efficient Zn–Air Battery” , Khaleel Ahmed Dilshad, M. K. Rabinal , <i>ACS Energy & Fuels</i> , 35, 12588-12598, (2021).	3.605
5	“CuO/Cu₂S Composites Fabrication and Their Optoelectronic Properties” , Rafiq Mulla, M.K.Rabinal , Mater. Renewable and Sustainable Energy, 1-7 (2021)	1.50
6	“Compositional Tuning of Negative Differential Resistance in Bulk Silver Iodide” , Smita.G. Naik and M.K. Rabinal , New Journal of Chemistry (RSC), DOI: 10.1039/D0NJ05427E (2021)	3.288
7	“A Low-Cost Apparatus to Measure the Seebeck Coefficient” , Rafiq Mulla and M.K. Rabinal , Phys. Education, 56(1), doi.org/10.1088/1361-6552/abbac4 (2020).	---
8	“A Rapid Synthesis of Silver Nanoparticle Foam by Ultrasonication” , B.K. Murgunde, Rafiq Mulla and M.K. Rabinal , J. Porous Materials, doi.org/10.1007/s10934-020-00951-8 (2020).	2.183
9	“Rapid Ambient Growth of Copper Sulfide Microstructures: Binder Free Electrodes for Supercapacitor” , Sajeeda Shaikh and M.K. Rabinal , J. Energy Storage, 28, 101288 (2020).	3.517
10	Invited Review: “Molybdenum Disulphide Hetero-interfaces as Potential Materials for Solar Cells, Energy Storage and Hydrogen Evolution” , Smita. G. Naik and M.K. Rabinal , <i>Energy Technology</i> , doi.org/10.1002/ente.201901299 (2020).	3.163
11	“Tuning DNA Electrical Conductivity by Silver Photo-Doping” , B.K. Murgunde and M.K. Rabinal , <i>Biomedical Physics and Engineering Express</i> , DOI 10.1088/2057-1976/abs5c04 (2019)	1.10
12	“A Tweezer as a Thermoelectric Tester” , Rafiq Mulla and M.K. Rabinal , <i>Phys. Education</i> , 54055032 (2019).	---

13	“TiO₂/rGO/CuS Nanocomposites for Efficient Photocatalytic Degradation of Rhodamine-B Dye” , Raghu.M Gunnagol, Mohammad Hussain K Rabinal, <i>Chemistry Select</i> , 4, 61 (2019).	1.716
14	“Experiment with Schottky Junction: Estimation of Metal-Semiconductor Interface Parameters” , Khaleel Dilshad and M.K. Rabinal, <i>European Journal of Physics</i> , 40, (2019).	0.861
15	“Foliar Application of Green Synthesized Zinc Sulphide and Zinc Oxide Nano Particles Enhances Growth, Root Attributes, Yield and Oil Quality of Sunflower (Helianthus Annuus L.)” Sham S. Patel, B. N. Aravinda Kumar, Meena Dharam Singh, S. C. Alagundagi, V. P. Savalgi & M. K. Rabinal, <i>Global J. Sci. Front. Res.: Agriculture and Veterinary</i> , 19(4), 2249 (2019).	---
16	“TiO₂-Graphene Nanocomposites for Effective Photocatalytic Degradation of Rhodamine-B Dye” Raghu.M Gunnagol, Mohammad Hussain K Rabinal, <i>Chemistry Select</i> , 3, (2018) 578-2585.	1.716
17	<i>Invited Review:</i> “Copper Sulfides: Earth Abundant and Low Cost Thermoelectric Materials” , Rafiq Mulla and M.K. Rabinal, <i>Energy Technology</i> , 2018, doi.org/10.1002/ente.201800850 .	3.163
18	“Defect Controlled Copper Iodide: A Promising and Eco-friendly Thermoelectric Material” , Rafiq Mulla and M.K. Rabinal, <i>Energy Technology</i> , (2017).	3.163
19	“Biologically Active Nanocomposite of DNA-PbS Nanoparticles: A new Material for Non-Volatile Memory Devices” , B.K. Murgunde, M.K. Rabinal and M.N. Kalasad, <i>Appl. Surf. Sci.</i> , 427, (2017) 344-353.	5.155
20	“Solution Processed Bilayer Junction of Silk Fibroin and Semiconductor Quantum Dots as Multilevel Memristor Devices” , B.K. Murgunde, M.K. Rabinal, <i>Organic Electronics</i> , 48, (2017) 276-284.	3.495
21	“Large Scale Synthesis of Copper Sulphide by Using Elemental Source Via Simple Chemical Route” , Rafiq. Mulla and M.K. Rabinal, <i>Ultra. Sonochem.</i> 39, (2017) 528.	7.279
22	“Ambient Growth of Highly Oriented Cu₂S Dendrites with Superior Thermoelectric Behaviour” , Rafiq. Mulla and M.K. Rabinal, <i>Appl. Surf. Sci.</i> 232, (2017) 181.	5.155
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Springer Series in Materials Science

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University of Electronic Science & Technology of China

Chapter Contributed: “Quantum Dot Interfaces for Memristors”

Authors: Sajeeda Shaikh, Rafiq Mulla, M.N. Kalasad & M.K. Rabinal
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