

Curriculum Vitae

Jayminkumar Rajanikant Ray

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EDUCATION

Ph.D., Applied Physics Department, The M.S. University of Baroda, 2013

Thesis Title: High Efficient Copper Indium Gallium Diselenide Thin Film Solar Cells

EXPERIENCE AND WORK SUMMARY

- Assistant Professor (February 2017 onward) at Department of Physics, Uka Tarsadia University, Maliba Campus, Bardoli-Mahuva Road, Bardoli, Dist-Surat, Gujarat, INDIA
- Assistant Professor (July 2016 to January 2017) at Physics Department at HVHP Science Collage and PG Research, Kadi Sarva Vishwavidhyalaya, Kadi, Gujarat, India
- Assistant Professor (August 2015 to July 2016) at Department of Physics, Indian Institute of Teacher Education (IITE), Gandhinagar, Gujarat, India
- Research Associate (April-2013 to August 2015), Dr. K. C. Patel Research and Development Centre, Charotar University of Science and Technology (CHARUSAT), Changa.
- Project fellow for UGC major project (2007 - 2010) at Applied Physics Department, The M.S. University of Baroda, Vadodara, India. Topic entitled: High Efficient Copper Indium Gallium Diselenide Thin Film Solar Cells.

Expertise/ RESEARCH AREA

Earth-abundant solution-based, vacuum processed fabrication and characterization of thin films and optoelectronic devices such as solar cells, photodetector, schottky diodes and gas sensors. Solar PV roof top grid connected system

Solution-based Deposition Techniques

- Direct Liquid Coating from ink (Dip-coating, Spin-coating, Spray-coating, Doctor blade, screen printing etc.) and Chemical bath deposition (conventional and microwave-assisted)

Vacuum-based Deposition Techniques

- RF/DC Magnetron Sputtering, Electron Beam Evaporation
- Thermal and Flash Evaporation

MEMBER of EDITORIAL / MENTOR TEAM

1. Mentor for "GTU Design Innovation Centre - AVPTI, Rajkot Spoke Mentorship Program - 2020-2021"
2. Materials Science: Materials Review, Whioce Publishing Pte. Limited, Singapore. (2018 onwards)
3. EnPress Publisher, LLC, California, U.S.A. (2018-2019)

SPONSORED PROJECTS (as PI)

1. **Title:** Fabrication of Hydroelectric cell (**Completed**)
Agency: Uka Tarsadia University, Bardoli, Gujarat, India, under B. U. Patel Research Promotion Scheme, 2019
2. **Title:** Microwave Processed CZTS Ink and Thin Films for Solar Cell Application (**Completed**)
Agency: Uka Tarsadia University, Bardoli, Gujarat, India, under Student Startup and Innovation Policy (SSIP) - Idea fest 2018
3. **Title:** Low Cost Instrumentation for Physics laboratory (**Completed**)
Agency: Uka Tarsadia University, Bardoli, Gujarat, India, under Student Startup and Innovation Policy (SSIP) - Idea fest 2018
4. **Title:** Development of PbS Nanoparticles for Flexible Photo-detector Application (**Completed**)
Agency: Indian Institute of technology of Bombay (IIT Bombay) under Indian Nanoelectronics Users Program (INUP) - 2017

INVITED TALK / ORAL PRESENTATION

1. **Invited talk** on "*Photon Energy*" in crash course for cracking IIT-JAM, JNU-CEEB entrance exam during 4th to 15th March, **2022** at C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat, India.
2. **Invited Talk** on "*Photovoltaic : Fundamental to Fabrication*" in Two days Workshop on "Sustainability - A Path for Future", during 25-26th February **2022**, jointly organized by Electrical Engineering Department, C. G. Patel Institute of Technology, Uka Tarsadia University and Navitas Solar, Sachin, Surat, Gujarat, India.
3. **Oral Presentation** on "*Effect of Copper Concentration on Structural Properties of CuSbS₂ Material for Solar Cell Application*" at International Conference on Renewable Energy, during 25th - 27th February **2022**, at Centre for Non-Conventional Energy Resources (CNCER), University Of Rajasthan, Jaipur
4. **Invited talk** in the **Webinar** on *Electrical Characterization of Material : Thin films to Thick films* during 13th January, **2022**, at Research Circle, Malaysia
5. **Invited talk** on *Electrical Characterization and I-V Measurement of the material* at Online Five-Day FDP on "Recent Advances in Material Characterization Techniques" during 15th - 19th February **2021** at Rajasthan Technical University, Kota Vivekananda Institute of Technology Jaipur, India.
6. **Jaymin Ray**, Kinjal Patel, **Oral-poster Presentation** on *Synthesis and Characterization of novel CuSbS₂ for solar cell application* at Virtual International Conference On Physical sciences (ICPS – 2021) during 5th - 6th February, **2021**, SVNIT, Surat, India

BEST ORAL PRESENTATION AWARD

7. **Invited talk** on *Influence of copper concentration on the structural properties of CuSbS₂* at International Conference on Smart Materials and Nanotechnology (ICSMN-2020) during January 02-04, **2020** at SKN Sinhgad College of Engineering, Pandharpur, Maharashtra, India
8. **Jaymin Ray**, Kinjal Patel, Keyur Patel, and Gopal Bhatt, **Oral Presentation** on “*Cu₂ZnSnS₄ (CZTS) as a potential absorber: Ink to thin film*” in International Conference on International Conference on Functional Materials and Simulation Techniques (ICFMST-2019) during 07-08 June **2019**, at Chandigarh University, Chandigarh, India
9. **Jaymin Ray**, Kinjal patel, **Oral Presentation** on “*The Studies on Cu₂ZnSnS₄ (CZTS) powder and thin film prepared from Molecular Ink*” in International Conference on Advances in Nanomaterials and Devices for Energy and Environment (ICAN-2019) during 27-29 January, **2019** at ABV-IIITM, Gwalior, India.
10. **Invited talk** on “*Light and Current*” in crash course for cracking IIT-JAM, JNU-CEEB entrance exam Phase-I during 10th – 15th December, **2018** at C. G. Bhakta Institute of Biotechnology, Uka Tarsadia University, Bardoli, Gujarat, India.
11. **Invited talk** on “*Hands-On Solar Cells and Modules Characterizations and MMP tracking*” in Solar Term Training Program on “Solar Photovoltaic Energy: Contemporary Technologies and Recent Advances (SPECTRA – 2016)” during 08-12 October, **2016**, at S. V. National Institute of Technology (SVNIT), Surat, Gujarat, India.
12. **Jaymin Ray**, T. K. Chaudhuri, **Oral Presentation** on “*Solution-Processed Nanocrystalline PbS-ZnO Solar Cells*” in International Conference on Sustainable Energy Technologies (ICSET 2014) held at PSG College of Technology, from 11-13 December **2014**, Coimbatore, India.
13. **Invited talk** on “*Material Characterization Techniques*” in short term course on Advances in Materials Characterization, organized by Charotar University of Science and technology (CHARUSAT), on 30 December **2014**, at Changa, Gujarat, India

ORGANIZING WORKSHOP / CONFERENCE / SYMPOSIA / WEBINAR

1. Webinar on “*Mass Loss from Sun*” by Dr. Wageesh Mishra, Max Planck Institute for Solar System Research, Germany on 10 May, 2020
2. Two-Day *Hands-on Workshop on “Sensors using Arduino*” at Department of Physics, Uka Tarsadia University, Bardoli, Gujarat, on 21-22 October 2019.
3. One day workshop on “*Nuclear Energy – The Vital Source*” at Department of Physics, Uka Tarsadia University, Bardoli, Gujarat, on September 27, 2018
4. One day Seminar on “*Radiation - A fact of life and DAE - Social benefits*” Department of Physics, Uka Tarsadia University, Bardoli, Gujarat, on September 1, 2017.
5. Hands-on training program on “*Basic Electrical Circuit Components and its Application in Device Fabrication*” Department of Physics, Uka Tarsadia University, Bardoli, Gujarat, on October 14, 2017.
6. Three days workshop on “*Hands-on Training: Solar Photovoltaic and Nanotechnology*” (SPANDN - 2017) at Department of Physics, Uka Tarsadia University, Bardoli, Gujarat, from 15-17 May 2017.

Book / Book Chapter

1. Jaymin Ray, Keyur Patel, Gopal Bhatt, C. J. Panchal, "**Fabrication of Copper Indium Gallium Diselenide (Cu(In,Ga)Se₂) Thin Film Solar cell**" in *Electrical and Electronic Devices, Circuits and Materials: Technological Challenges and Solutions*
John Wiley & Sons, and Scrivener Publishing, ISBN: 978-1-119-75036-9 (2021)
2. Kinjal Patel, Jaymin Ray, Sweety Panchal "**Fabrication and Characterization of Nano-Crystalline Lead Sulphide (PbS) Thin Film on Fabric for Flexible Photodetector**" in *Electrical and Electronic Devices, Circuits and Materials: Design and Applications*
CRC Press, Taylor & Francis Group, ISBN-13: 978-0367564261 (2021)
3. Jaymin Ray (Chief Editor), Dr. Shyam Sunder Sharma (Co-Editor) *Recent Review and Research in Physics (Volume – 1)*
AkiNik Publications, New Delhi, ISBN No.: 978-93-5570-166-4 (2022)

Refereed Journal Articles

1. Prashant R Ghediya, Yash M Palan, Drashti P Bhangadiya, Ishrat I Nakani, Tapas K Chaudhuri, Kinjal Joshi, CK Sumesh, Jaymin Ray, **Electrical properties of Ag/p-Cu₂NiSnS₄ thin film Schottky diode**, Materials Today Communications 28 (2021) 102697
2. Usha Parihar, Jaymin Ray, Naresh Padha, C. J. Panchal, **Effect of CuIn_{1-x}Al_xSe₂ (CIAS) thin film thickness and diode annealing temperature on Al/p-CIAS Schottky Diode**, Bulletin of Material Science 43 (2020) 274
3. Prashant R. Ghediya, Tapas K. Chaudhuri, Jaymin Ray, Heena L.Panjwani, Priyanka J.Hemani, Priya P. Paneri, Raviraj sinh, J.Jadav, Keyur D. Rupapara, Ritesh R. Joshi, **Synthesis and characterizations of copper cadmium sulphide (CuCdS₂) as potential absorber for thin film photovoltaics** Materials Chemistry and Physics 252 (2020) 123382
4. Prashant R. Ghediya, Tapas K. Chaudhuri, Jaymin Ray, **Electrical transport properties of dip-coated nanocrystalline Cu₂ZnSnS₄ thin films**, Journal of Materials Science: Materials in Electronics, 31(1) (2020) 658–666
5. Jaymin Ray, Tapas K. Chaudhuri, Chetan Panchal, Kinjal Patel, Keyur Patel, Gopal Bhatt, Priya Suryavanshi, **PbS-ZnO Solar Cell: A Numerical Simulation**, Journal of Nano- and Electronic Physics, 9 (2017) 03041
6. K. J. Patel, G.G Bhatt, J. R. Ray, Priya Suryavanshi, C. J .Panchal, **All Inorganic Solid State Electrochromic Devices: A Review**, Journal of solid State electrochemistry, DOI: 10.1007/s10008-016-3408-z (2016)
7. Jaymin Ray, Mitesh Patel, Prashant Ghediya and Tapas K Chaudhuri, **Preparation and characterization of chemically deposited nickel sulphide film and its application as a potential counter electrode**, Material Research Express, 3 (2016) 075906
8. Dhaval Vankhade, Jaymin Ray and Tapas K. Chaudhuri, **Nanocrystalline PbS thin films as photodetectors**, Advanced Science Letters, 22 (2016) 1022-1025
9. Usha Parihar, Jaymin Ray, C.J. Panchal and, N. Padha **Influence of temperature on Al/p-CuInAlSe₂ thin-film Schottky diodes**, Applied Physics A, 122 (2016) 568

10. Mitesh H. Patel, Tapas K. Chaudhuri, Jaymin Ray, Sachin Joshi, **Facile one-step synthesis of PbS/Polyvinylpyrrolidone nanocomposite films**, *Advanced Science Letters*, 22 (2016) 1064-1066
11. Jaymin Ray, Tapas K. Chaudhuri, **Growth and structural properties of Molybdenum thin films deposited by DC sputtering**, *Journal of Optoelectronics and Advanced Materials*, 17 (5-6) (2015) 634
12. J.R. Ray, M.S. Desai, C.J. Panchal, Bharati Rehani, P.K. Mehta, **Effect of Rapid Thermal Annealing of CIGS Thin Film as an Absorber Layer**, *J. Nano- Electron. Phys.*, 5(2) (2013) 02014.
13. Usha Parihar, K. Sreenivas, J.R. Ray, C.J. Panchal, N. Padha, Bharati Rehani, **Influence of substrate temperature on structural, optical, and electrical properties of flash evaporated $\text{CuIn}_{0.81}\text{Al}_{0.19}\text{Se}_2$ thin films**, *Materials Chemistry and Physics*, 139 (2013) 270 – 275.
14. Bharati Rehani, J.R. Ray, C.J. Panchal, Hamza Master, R.R. Desai, P.B. Patel, **Mechanochemically Synthesized CIGS Nanocrystalline Powder for Solar Cell Application** *J. Nano- Electron. Phys.*, 5(2) (2013) 02007.
15. V.B. Padhiar, A.L. Patel, J. R. Ray, M.S. Desai, C.J. Panchal, **Laser scribing optimization of RF magnetron sputtered molybdenum thin films**, *J. Nano- Electron. Phys.*, 3(1) (2011) pp. 9-16.
16. J.R. Ray, N.M. Shah, M.S. Desai C.J. Panchal, **Molybdenum back-contact optimization for CIGS thin film solar cell**, *J. Nano- Electron. Phys.*, 3(1) (2011) pp. 766-775.
17. J.R. Ray, M.S. Desai, C.J. Panchal, P.B. Patel, **Magnetron sputtered Al-ZnO thin films for photovoltaic applications**, *J. Nano- Electron. Phys.*, 3(1) (2011) pp. 755-765.
18. J.R. Ray, C.J. Panchal, M.S. Desai, U.B. Trivedi, **Simulation of CIGS thin film solar cells using AMPS-1D**, *J. Nano- Electron. Phys.*, 3(1) (2011) pp. 747-754.
19. U. Parihar, J.R. Ray, N. Kumar, R. Sachdeva, N. Padha, C.J. Panchal, **Impact of annealing on CuInSe_2 thin films and its schottky interface**, *J. Nano- Electron. Phys.*, 3(1) (2011) pp. 1086-1095.
20. N.M. Shah, J.R. Ray, M.S. Desai, C.J. Panchal, **Influence of substrate temperature on structural, optical and electrical properties of evaporated cadmium sulphide thin films**, *Journal of optoelectronics and advance materials*, 12(10) (2010) pp. 2052-2056
21. N.M. Shah, J.R. Ray, C.J. Panchal, V.A. Kheraj, M.S. Desai, **Structural, optical and electrical properties of flash evaporated Copper Indium Diselenide thin films**, *Journal of Material Science*, 44 (2009) pp. 316-322.
22. N.M. Shah, J.R. Ray, K.J. Patel, V.A. Kheraj, M.S. Desai, C.J. Panchal, Bharati Rehani, **Structural, electrical and optical properties of copper indium diselenide thin films prepared by thermal evaporation method**, *Thin Solid Films*, 517 (2009) pp. 3639-3644.
23. N.M. Shah, C.J. Panchal, V.A. Kheraj, J.R. Ray, M.S. Desai, **Growth, Structural and optical properties of copper indium diselenide thin films deposited by thermal evaporation method**, *Solar Energy*, 83 (2009) pp. 753-760.

1. Jaymin Ray, Kinjal Patel, Keyur Patel, Gopal Bhatt, Usha Parihar, **Studies on $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) powder and thin film prepared from Molecular ink**, Materials Today: Proceedings, November 2020 (DOI: 10.1016/j.matpr.2020.10.165)
2. Jaymin Ray, Kinjal Patel, **Influence of carrier concentration on the performance of CIAS solar cell**, AIP Conference Proceedings 1961 (2018) 030029 presented at International Conference On Nanomaterials For Energy Conversion And Storage Applications (NECSA 2018) at PDPU, Gujarat, India during 29–31 January 2018
3. Jaymin Ray, Keyur Patel, Gopal Bhatt on **Growth and Structural study of Zinc Oxide thin film deposited by Chemical Bath Deposition** Proceedings of the National conference on Advanced Functional material & their Applications (AFMA) held at Govt. Women Engineering College, Ajmer from 11-12 December 2015
4. J.R. Ray, M.S. Desai, C.J. Panchal, Bharati Rehani, **The influence of the CIGS film thickness on its growth and optical properties**, AIP Conf. Proc. 1451, 251-253 (2012): Indian Vacuum Society Symposium on Thin Films: Science and Technology on 9–12 November 2011 at IIT, Mumbai
5. J.R. Ray, M.S. Desai, C.J. Panchal, **Synthesis and Characterization of copper indium gallium diselenide (CIGS) powder for solar absorber**, Proceedings of the 54th DAE Solid State Physics Symposium (2009), pp. 447 on 14 – 18 December, 2009 at Department of physics, The M. S. University of Baroda, Vadodara, Gujarat.
6. N.M. Shah, K.J. Patel, V.A. Kheraj, J.R. Ray, Bharti Rehani, V.J. Rao, M.S. Desai, C.J. Panchal, **Optical and structural characterization of copper indium diselenide thin films prepared by direct thermal evaporation of the compound material**, Proceedings of the international conference on solar cells (IC-SOLACE 2008) pp. 272 on 21 – 23 January, 2008 at Department of physics, Cochin university of science and technology, Cochin.

CONFERENCE POSTER PRESENTATIONS

1. Jaymin Ray, T. K. Chaudhuri, C J Panchal, and Kinjal Patel, Poster presentation on **PbS-ZnO Solar cell : Fabrication and Numerical simulation**, in International Symposium on Semiconductor Material and Devices (ISSMD 4) at Jadavpur university, Kolkata from 8-10 March 2017
2. Prashant R. Ghediya, Jaymin Ray and Tapas K. Chaudhuri, **Low-Temperature Transport Properties of $\text{Cu}_2\text{ZnSnS}_4$ Prepared From Ink**, Science Meet, 09 November 2014 at CHARUSAT, Changa, Gujarat.
3. Dhaval Vankhade, Jaymin Ray, Prashant Ghediya, Mitesh Patel and Tapas K. Chaudhuri, **Nano PbS Films on Filter Paper for Ammonia Gas Sansor**, Science Meet, 09 November 2014 at CHARUSAT, Changa, Gujarat.
4. J.R. Ray, T. K. Chaudhuri, **Deposition of Molybdenum Thin Films by DC Sputtering** at International Union of Materials Research Societies – International Conference in Asia – 2013 (IUMRS-ICA-2013) on 16-20 December, 2013 at IISc Bangalore, India.
5. J.R. Ray, M.S. Desai, C.J. Panchal, Bharati Rehani, P.K. Mehta, **Effect of Rapid Thermal Annealing of CIGS Thin Film as an Absorber Layer** at Second International Symposium on



Semiconductor Materials and Devices (ISSMD-2013) on 31th January - 2nd February, 2013 at University of Jammu, Jammu Tawi, Jammu and Kashmir.

BEST POSTER AWARD

6. J.R. Ray, M.S. Desai, C.J. Panchal, **Automated Measurement of Current-Voltage (I-V) Characteristic to Evaluate The Parameters For Solar Cells Applications** in National Symposium on Vacuum Technology and its Application to Electronic Device and Systems (IVSNS 09) on 11 -13 November, 2009 at CEERI, Pilani, Rajasthan.
7. J.R. Ray, M.S. Desai, C.J. Panchal, **Morphological, Optical, and Electrical Property of CIGS Thin Films for Solar Cell Applications** at Condense Matter Days (CMDAYS 09) on 26 – 28 August, 2009 at the department of physics, Jadavpur University Kolkata.

EXTRA CURRICULAR ACTIVITIES

1. National Cadet Corps (NCC) Certificate 'C' with 'C' Grade (Army Wing), 2005, Ministry of Defense, Government of India, Vallabh Vidhyanagar.
2. National Cadet Corps (NCC) Certificate 'B' with 'B' Grade (Army Wing), 2004, Ministry of Defense, Government of Indian, Vallabh Vidhyanagar.

PERSONAL INFORMATION

1. Name : Jayminkumar Rajanikant Ray
2. Address : C-14, Uma Colony, Waghidya road, Vadodara- 390019, Gujarat (India).
3. Date of Birth : 31st October, 1984
4. Nationality : Indian
5. language known : English, Hindi, Gujarati

REFERENCES

1. Dr. Nitin Shah
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Department of Physics,
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2. Dr. Vipul Kheraj
Associate Dean (Faculty Welfare), SVNIT
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