

Curriculum Vitae

Dr. Vikas Thakur (Assistant Professor)
Ph.D & Post-Doc in Physics (Solid State Physics/Materials Science)

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A. Educational Qualifications

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|-------------------------------|--|
| Ph.D in Physics (2015) | (Experimental Materials Science, Nanomaterials)
School of Studies in Physics, Jiwaji University,
Gwalior, India. |
| M. Sc. in Phys. (2006) | School of Studies in Physics, Jiwaji University,
Gwalior, India. |
| B.Sc. (2004) | Himachal Pradesh University, Shimla, India, 2004. |

B. Academics/Research Related Experience

Experience

- **March 2021 - till date: Assistant Professor**, Department of Physics, Vallabh Govt. College Mandi, H.P. India.
- **June 2018 - Feb 2021: Assistant Professor**, Department of Physics, Govt. College Sarkaghat Mandi, H.P. India.
- **June 2017 - June 2018: Assistant Professor**, Department of Physics, Bahra University, Wagnaghat, H.P. India.
- **September 2016 - May 2017: Postdoctoral Research Scientist** School of Power and Mechanical Engineering, Wuhan University, Wuhan, PR China.
- **July, 2014 - August 2016: Assistant Professor** in the Department of Electronics and Communication, Manav Rachna University, Faridabad India.
- **Dec, 2012 - June 2014: UGC Project Fellow** School of Studies in Physics, Jiwaji University, Gwalior, M.P. India.
- **May, 2010 - Nov. 2012: Assistant Professor** in the Department of Physics, Institute of Information Technology and management (IITM), ITM University, Gwalior, M.P. India.
- **May, 2009 - March, 2010: Lecturer** in the Department of Physics, Shriram Institute of Information Technology and management (SRIIT), Gwalior, M.P. India.

Administrative and Other Experiences

- **Coordinator, Ph.D. Programme**, Manav Rachna University, Faridabad.
- **Assistant Controller of Examination**, Shriram Institute of Information Technology and management (SRIIT), Gwalior.
- **Coordinator, Science Academies' Refresher Course in Experimental Physics** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.

Conference/Seminar/Workshop/Refresher Course Organized

- **Science Academies' Refresher Course in Experimental Physics** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
Total Funding Received: Rs. 9,25,600/-
Sponsor: Indian Academy of Sciences, Bangaluru.

Faculty Development Programme (FDP) Attended

- Two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
- Four Week **'Induction/Orientation Programme'** Organized by Teaching and Learning Centre, Ramanujan College University of Delhi under the aegis of Ministry of Education (Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching), from 21st March – 19th April, 2022.
- Two week **'Induction Programme'** held at Govt College of Teacher Education Dharmshala H.P. India from 25 June 2018 – 07 July 2018.
- Two week **'SERC School on Laser Produced Plasmas: Physics and Applications'** held at Rajaramanna Centre for Advance Technology, Indore
- One week Short Term Course on **'Nanomaterials: Characterization & Applications'** Held at National Institute of Technical Teachers Training Chandigarh Sponsored by MHRD, Govt. of India.
- Five day Workshop on **'Research Methodology'** Organized by Manav Rachna University Faridabad.
- FDP on **'Office Functioning & how to be more productive at work'** organized by Manav Rachna Academic Staff College.
- FDP on **'Internal Quality Assurance'** organized by Manav Rachna Academic Staff College.
- Workshop on **'NBA Accreditation'** organized by Manav Rachna College of Engineering.
- FDP on **'Communication Skills'** organized by Manav Rachna Academic Staff College.

C. Research Profile

Research Interest

Growth, characterization and applications of thin film and nano materials, Nanoscale processing for advanced materials and devices, Optoelectronic devices, Diluted magnetic semiconductors, Spintronics, gas/chemical sensors etc. ***My Current research focuses on the Quantum Dot based solar cells.***

Experimental Skills

- Quantum dots synthesis by Hot Injection Method utilizing Schlenk Line and post-synthesis ligand exchange process.
- Skilled in materials growth by wet chemical, sol-gel, spray pyrolysis, vacuum co-evaporation, chemical vapor deposition and electrodeposition techniques.
- Skilled in the analysis of data obtained using XRD, SEM/EDAX, TEM/SAED, TGA/DTA, VSM and SQUID magnetometers, and FTIR and Raman spectroscopy techniques.
- Experienced in optical characterization techniques like UV-VIS-NIR, and Photoluminescence (PL) spectroscopy.
- Skilled in performing electrical measurements using four probe, hot probe and Hall effect techniques etc.
- Fabrication and characterization of solar cells, photodetectors and thin film field effect transistors etc.

Research Experience

1. Post-Doctoral Research (Sept. 2016 – June 2017)

Quantum dot (QD) based Photovoltaic devices

The work include the growth of high quality homogeneous and monodispersed Quantum dots of CsPbI₃ and Sb₂Se₃, study of transport properties of QD thin films and solar cell fabrication and characterization.

2. Assistant Professor (Research and Teaching) (July 2014-August 2016)

Writing and submission of research proposal to obtain funds and establishment of research lab. Guided M.Tech. students for their project work and dissertation. Registered as a PhD guide in Manav Rachna University Faridabad.

3. Project Fellow UGC (Govt. of India) funded research project, (Dec. 2012 to July 2014):

Project Title: *“Synthesis and Characterization of Transition metal doped ZnO Nanoparticles for Diluted Magnetic Semiconductors Applications”*.

Major Responsibilities:

- Growth of Co, Mn and Ni doped ZnO thin films using spray pyrolysis.
- Structural, morphological and optical characterization of grown films.

- Study of the magnetic properties of grown material using the VSM and SQUID magnetometers.

4. Doctoral Research (2007-2014)

Thesis Title: Growth and Properties of ZnO Nanoparticles.

Outlines of the PhD work:

- Growth of ZnO nanoparticles using a simple and low cost wet chemical technique and the study of their growth mechanism, and the structural, morphological and optical properties.
- Growth of nanocrystalline thin films of ZnO using a sol-gel dip-coating technique and their characterization using various techniques.
- Growth of ZnO thin films using spray pyrolysis and their characterization.
- Growth of highly transparent and conducting Al doped ZnO films using spray pyrolysis.
- Growth of Nitrogen doped p-type ZnO films using spray pyrolysis and their structural, optical and electrical studies.
- Fabrications of n-ZnO/p-ZnO homojunctions using spray pyrolysis and their I-V characteristics.
- Growth of Transition metal doped ZnO diluted magnetic semiconductor thin films using spray pyrolysis for spintronic applications.

Invited Talk/Lecture Delivered

1. Invited talk on **Mechanics: Force, Work, Energy, and Power** in National Workshop on 'Content Development of Physics Curriculum in Indian Perspectives in the Light of NEP-2020', June 29-30, 2022.
2. Special Lecture on **Optoelectronic devices and their applications** in two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
3. Lecture on **Verification of Curie-Weiss Law for a Ceramic** in two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
4. Lecture on **Capacitor Dielectric Constant of a non-polar liquid and dipole moment of acetone** in two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
5. Lecture on **TCR of Copper, and, Energy Band Gap of Si** in two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
6. **Thermal and Electrical Conductivity of Copper, and, thermal conductivity of a poor conductor** in two week **Science Academies' Refresher Course in 'Experimental Physics'** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.

7. **Quantum Dots Based Photovoltaic Devices, in National Conference on ‘Changing Trends, Future Challenges and Innovations in Science & Technology’** organized by A.P. Goyal Shimla University, Shimla, May, 2017.

Seesion Chair in Conferences/Seminar

1. International Conference on **‘Recent Trends in Bio and Material sciences’**, Organized by Him Science Congress Association in Collaboration with Sardar Patel University Mandi H.P., Oct 10-11, 2022.
2. National Conference on **‘Changing Trends, Future Challenges and Innovations in Science & Technology’** organized by A.P. Goyal Shimla University, Shimla, May, 2017.
3. National Conference on ***‘Emerging Trends and Innovations in Electronics and Communication’*** organized by Manav Rachna University, Faridabad (2016).

Conferences/Seminars/Workshop/School Attended

1. Attended International Conference on **‘Recent Trends in Bio and Material sciences’**, Organized by Him Science Congress Association in Collaboration with Sardar Patel University Mandi H.P., Oct 10-11, 2022.
2. Attended National Workshop on **‘Content Development of Physics Curriculum in Indian Perspectives in the Light of NEP-2020’**, June 29-30, 2022.
3. Attended Two week **Science Academies’ Refresher Course in ‘Experimental Physics’** held at Vallbh Govt. College Mandi H.P. during 16-31 May, 2022.
4. Attended Workshop on **‘Analytical Instrumentation’** organized by SAIF Punjab University Chandigarh and MLSM College Sunder Nagar Mandi, July 1-2, 2021.
5. Attended National Conference on **‘Changing Trends, Future Challenges and Innovations in Science & Technology’** organized by A.P. Goyal Shimla University, Shimla, May, 2017.
6. Attended National Conference on ***‘Emerging Trends and Innovations in Electronics and Communication’*** organized by Manav Rachna University, Faridabad (2016).
7. Attended Short Term Course on ***‘Nanomaterials: Characterization & Applications’*** held at National Institute of Technical Teachers Training Chandigarh Sponsored by MHRD, Govt. of India, November 16-20, 2015.
8. Attended National Conference on ***‘Recent Innovations in Applied Sciences and Humanities’*** organized by Rawal Institutions Faridabad, October 10, 2015.
9. Attended workshop on ***‘Intellectual Property Rights’*** organized by Manav Rachna International University, Sponsored by Department of Electronics and Information Technology (DIETY), Ministry of Communication & IT, Govt. of India, June 17, 2015.
10. Attended National Conference ***‘Electrochemistry for Cleaner Environment’*** held at Jiwaji University, Gwalior during January 17-18, 2014.

11. Attended '**Two Day Interaction Meeting on Photoelectron Spectroscopy**' held at Rajaramanna Centre for Advance Technology, Indore during August 29-30, 2013.
12. Attended international conference '**Recent Trends in Applied Physics and Material Science**' held at Govt. College of Engg. And Tech. Bikaner during February 1-2, 2013.
13. Attended '**57th Solid State Physics Symposium (DAE-SSPS 2012)**' held at IIT Mumbai during December 3-7, 2012.
14. Attended '**Fourth SERC School on Laser Produced Plasmas: Physics and Applications**' held at Rajaramanna Centre for Advance Technology, Indore during July 9-21, 2012.
15. Attended '**55th Solid State Physics Symposium (DAE-SSPS 2009)**' held at Manipal University, Manipal during December 26-30, 2010.
16. Attended '**54th Solid State Physics Symposium (DAE-SSPS 2009)**' held at The Maharaja Sayajirao University of Baroda, Vadodara during December 14-18, 2009.
17. Attended '**24th MP Young Scientists Congress**' held during February 28-01 March, 2009.
18. Attended '**53rd Solid State Physics Symposium (DAE-SSPS 2008)**' held at Bhabha Atomic Research Centre, Mumbai during December 16-20, 2008.
19. Attended National Conference '**Recent Advances in Innovative Materials (RAIM-08)**', National Institute of Technology, Hamirpur, India 2008.
20. Attended national conference '**NATCOM NAMTECH-2007**' held at Department of Physics, Lucknow University during 8-10 Dec. 2007.
21. Attended national seminar '**Recent Advances in Thin Film Technology**' held at Department of Engineering Physics, Institute of Technology & Management Gwalior during 26-27 October 2007.

List of Publications

Books:

1. '**Growth and Properties of CdS and CdZnS Thin Films**', Urvashi Verma and **Vikas Thakur**, Lambert Academic Publishing (2021) ISBN: 978-620-4-18355-8.
2. '**Practical Physics (Mechanics)**', J. Sharma, G. Kumar and **Vikas Thakur**, Vinesh JMD Publication 2020.

Papers:

1. **Vikas Thakur**, Urvashi Verma, Growth of Co Doped ZnO Thin Films Exhibiting Room Temperature Ferromagnetism Using a Low Cost Spray Pyrolysis Technique, *Bulletin of Materials Science (Springer)*, 45 (2022) 32.
2. **Vikas Thakur**, Urvashi Verma, Recent Advances in Sb₂Se₃ Solar Cell Absorber Material and devices, International Conference on '**Recent Trends in Bio and Material sciences**', Organized by Him Science Congress Association in Collaboration with Sardar Patel University Mandi H.P., Oct 10-11, 2022.

3. Urvashi Verma, **Vikas Thakur**, Recent Progress in Perovskite Solar Cells: Challenges from Efficiency to Stability, International Conference on '**Recent Trends in Bio and Material sciences**', Organized by Him Science Congress Association in Collaboration with Sardar Patel University Mandi H.P., Oct 10-11, 2022.
4. T. Chandel, **Vikas Thakur**, M. B. Zaman, S. K. Dwivedi and P. Rajaram, Ultrasonic assisted sol-gel synthesis of nanocrystalline $\text{Cu}_2\text{ZnSnS}_4$ particles for solar cell applications, *Materials Letters (Elsevier)* 212 (2018) 279-282.
5. T. Chandel, **Vikas Thakur**, S. Halaszova, M. Prochazka, D. Hasko, Dusan Velic and P. Rajaram, Growth and Properties of Sprayed CZTS Thin Films, *Journal of Electronic Materials (Springer)* 47 (2018) 5477-5487.
6. T. Chandel, **Vikas Thakur**, S. K. Dwivedi, M. B. Zaman and P. Rajaram, Structural, Morphological and Optical Studies of F Doped SnO_2 Thin Films, *AIP Conf. Proc.* 1953 (2018) 100005-1-100005-4.
7. T. Chandel, S. K. Dwivedi, P. Rajaram, **Vikas Thakur**, Synthesis of CZTS Nanoparticle for Solar Cell Applications, *International Journal of Innovative Research in Computer and Communication Engineering*, 4 (2016) 320-324.
8. M. Malik, S. K. Dixit, **Vikas Thakur**, A. Kumari, J. Singh, C. Bhatnagar, P. K. Bhatnagar, Optimizing P3HT/PCBM films for improving power conversion efficiency in polymer bulk heterojunction solar cells by using SWCNT, *International Journal of Innovative Research in Computer and Communication Engineering*, 4 (2016) 162-168.
9. P. Tonk, T. Dawa, M. Dorji, D. Chozam, H. S. Bhullar, **Vikas Thakur**, T. Chandel, M. Muthuvinayagam, U. Verma, Synthesis and Characterization of ZnS Nanoparticles, *International Journal of Innovative Research in Computer and Communication Engineering*, 4 (2016) 331-334.
10. Z. Chauhan, C. B. Pradhan, M. Kumari, D. R. Chetri, T. N. Kafley, S. Zangpo, P. Singh, S. Dorji, **Vikas Thakur**, T. Chandel, U. Verma, Growth and Characterization of ZnO Nanoparticles, *International Journal of Innovative Research in Computer and Communication Engineering*, 4 (2016) 335-337.
11. U. Verma, **Vikas Thakur**, P. Rajaram and A. K. Shrivastava, Structural, morphological and optical properties of sprayed nanocrystalline thin films of $\text{Cd}_{1-x}\text{Zn}_x\text{S}$ solid solution, *Electronic Materials Letters (Springer)* 11 (2015) 46-54.
12. **Vikas Thakur**, U. P. Verma and P. Rajaram, Band edge emission in sprayed ZnO thin films, *Electronic Materials Letters (Springer)* 10 (2014) 1143-1147.
13. **Vikas Thakur**, U. P. Verma and P. Rajaram, Wet chemical synthesis of ZnO nanocrystals: Dependence of growth and morphology on the solvent composition, *Journal of Materials Science: Materials in Electronics (Springer)* 25 (2014) 3242-3250.
14. D. Prasher, K. Dhakad, A. K. Sharma, **Vikas Thakur** and P. Rajaram, Electrochemical growth and studies of CuInTe_2 thin films, *International journal of materials science and applications*, 3 (1) (2014) 1-5.
15. S. Sharma, M. A. Malik, T. Chandel, **Vikas Thakur** and P. Rajaram, Growth and characterization of ZnSe nanoparticles, *American Institute of Physics (AIP) Conference Proceedings*, 1591 (2014) 474-476.

16. **Vikas Thakur**, U. P. Verma and P. Rajaram, Solvent dependent growth of fibrous and non-fibrous nanocrystalline thin films of ZnO, *Journal of Sol-Gel Science and Technology (Springer)* 66 (2013) 280-287.
17. **Vikas Thakur**, U. Verma, U. P. Verma and P. Rajaram, Room temperature ferromagnetism in Co doped ZnO thin film grown using spray pyrolysis, *American Institute of Physics (AIP) Conference Proceeding* 1536 (2013) 1029-1030.
18. U. Verma, **Vikas Thakur**, P. Rajaram and A. K. Shrivastava, Fabrication of high quality nanocrystalline Cd_{1-x}Zn_xS thin films for optoelectronic applications, *American Institute of Physics (AIP) Conference Proceedings* 1512 (2013) 674-675.
19. **Vikas Thakur**, U. Verma, U. P. Verma and P. Rajaram, Effect of Al doping on the properties of ZnO thin films grown by spray pyrolysis, *American Institute of Physics (AIP) Conference Proceedings* 1349 (2011) 681-682.
20. U. Verma, **Vikas Thakur**, P. Yadav and A. K. Shrivastava, Synthesis and characterization of nanocrystalline CdZnS thin films, *American Institute of Physics (AIP) Conference Proceedings* 1349 (2011) 699-700.
21. **Vikas Thakur**, P. S. Bisht, U. P. Verma, and P. Rajaram, A study on isolated zigzag single wall ZnS nanotubes using ab-initio pseudopotential method, *Journal of Computational and Theoretical Nanoscience; American Scientific Publishers (ASP)* 6 (2009)212-215.
22. **Vikas Thakur**, D. Prasher, U. P. Verma and P. Raja Ram, Growth of ZnO nanocrystals, *Department of atomic energy, India - Solid State Physics Symposium (DAE-SSPS) Proceedings, Vol. 54*, pp. 395-396 (2009) India.
23. U. Verma, **Vikas Thakur**, P. Yadav and A. K. Shrivastava, Synthesis and characterization of nanocrystalline CdPbS thin films, *DAE-SSPS Proceedings, Vol. 54*, pp. 645-646 (2009) India.
24. D. Prasher, **Vikas Thakur**, A. K. Sharma and P. Rajaram, Morphological structural and compositional studies of CuInSe₂ Thin Film by pulse electrodeposition technique, *DAE-SSPS Proceedings, Vol. 54*, pp. 633-634 (2009) India.
25. **Vikas Thakur**, D. Prasher, A. K. Sharma and P. Rajaram, Synthesis and characterization of ZnO nanoparticles, *DAE-SSPS Proceedings, Vol. 53*, pp. 401-402 (2008) India.
26. **Vikas Thakur**, D. Prasher, A. K. Sharma, U. P. Verma and P. Rajaram, Growth of ZnO nanocrystals by Chemical Route, *International Conference on Multi functional Oxide Materials (ICMOM-09)*, April 16-18, 2009, HP University Shimla, India.
27. **Vikas Thakur**, D. Prasher, U. P. Verma and P. Rajaram, Growth and characterization of ZnO nanocrystals, *National Conference: Current Trends in Nano Science & Technology (CTNT-09)*, Jan 15-16, 2009, ABV Indian Institute of Information Technology and Management, Gwalior, India.
28. D. Prasher, **Vikas Thakur** and P. Rajaram, Synthesis and characterization of electrodeposited CuInSe₂ nanoparticle thin films, *National Conference: Current*

- Trends in Nano Science & Technology (CTNT-09)*, Jan 15-16, 2009, ABV Indian Institute of Information Technology and Management, Gwalior, India.
29. **Vikas Thakur**, P. S. Bisht, U. P. Verma and P. Rajaram, Electronic band structure of (n,0) single wall carbon nanotubes (n=9, 12 and 15), **National Conference: 'NATCOM NAMTECH-2007'**, Department of Physics, Lucknow University, India.
30. **Vikas Thakur**, P. S. Bisht, U. P. Verma and P. Rajaram, Electronic band structure of isolated zigzag single wall carbon nanotubes, **National Conference: Recent Advances in Innovative Materials (RAIM-08)**, National Institute of Technology, Hamirpur, India.

Personal Profile

Date of Birth	18 th Oct, 1983
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