Shalik Ram Joshi,
Post Doctoral Researcher,
Department of Physics, Ajou University,
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Previous Education

Post Doctoral Fellow (August, 2017 to August, 2021)
Department of Mechanical Engineering,
Ulsan National Institute of Science and Technology,
Ulsan, South Korea

Post Doctoral Researcher (August, 2016 to July, 2017)
Graphene Development Cell, Tata Steel, Jamshedpur, India

Ph. D. Physics, Institute of Physics, Sachivalaya Marg, Bhubaneswar, 2016.
Thesis Title: *Nanostructure Formation on Rutile TiO_2 and Ta surfaces by Ion Beam Irradiation: Photo absorption, Magnetism, Scaling and KMC Studies*
Thesis Adviser: Prof. Shikha Varma.

Diploma in Advanced Physics, M. Phil., Institute of Physics, Sachivalaya Marg, Bhubaneswar, 2011.

M. Sc. Physics Department of Physics and Astrophysics, University of Delhi, North Campus, India, 2009.

B. Sc. (Hons) Physics Kirori Mal College, University of Delhi, North Campus, India, 2007.

Honors and Awards

- ▷ Junior Research Fellowship (2010-2012) by Department of Atomic Energy, India.
- ▷ Senior Research Fellowship (2012-2016) by Department of Atomic Energy, India.
- ▷ Graduate aptitude test in Engineering (GATE) qualified for enrollment in prestigious Indian Institute of Technologies (IIT's), 2010. (All India Rank 92).

- ▷ Qualified Joint Entrance Screening Test (JEST), 2010 (Percentile 97).
- ▷ Qualified Haryana Teacher Eligibility Test (HTET) which is required to get a Lecturer position in this State, 2010.

Research Interest

- ▷ Synthesis of low dimensional materials and their applications for light weight composite materials, energy harvesting, environmental sensors, etc.
- ▷ Fabrication of composite materials using 3d printing technology
- ▷ Thermal properties of organic polymers using Differential 3ω method.
- ▷ Thermal properties of suspended 2D materials using Raman spectroscopy.
- ▷ Defect induced modification in physical and chemical properties of nanomaterials.
- ▷ Electronic and magnetic properties of wide band gap semiconductors.
- ▷ Interaction of ion beam modified surface with and bio molecules (DNA).
- ▷ Numerical Simulation of ion beam irradiated surfaces using Kinetic Monte Carlo Simulation to study the patterned surfaces.

Scientific Skills

- ▷ **Experimental Skills**

  Growth Techniques

  E-beam and thermal evaporation, High Vacuum Furnace, Chemical Vapor Deposition (CVD), Plasma Enhanced Chemical Vapor Deposition (PECVD), Ion Beam Irradiation using Pelletron Accelerator.

  Characterization Techniques

  X-ray photo electron spectroscopy, Raman spectroscopy (LT and Confocal), Atomic Force Microscopy and its several modes, XRD, SEM, UV-Vis, PL, NMR, Thermogravimetric Analysis, Differential Scanning Calorimetry, Rheological Properties, Dynamical Mechanical Analyzer, Contact Angle Measurement, SQUID, RBS and Channeling using Ion Beam Accelerator.

- ▷ **Computational Skills**

  Kinetic Monte Carlo simulation, Quantum Espresso, LMTO, VASP, CTM4XAS, Labspec, Nanoscope, WSXM, FORTRAN, C, Mathematica, Latex, proficient in Linux and Windows operating system.

List of Publications

1. *Superhydrophobic and self-sterilizing surgical masks spray-coated with carbon nanotubes*,
   Ritesh Soni, **Shalik Ram Joshi**, Mamata Karmacharya, Hyegi Min, Shin-kwan Kim, Sumit Kumar, Gun-Ho Kim, Yoon-Kyoung Cho, Chang Young Lee
   ACS Applied Nanomaterials, 4, 8491, (2021)

2. *Interphase strengthening of carbon fiber/polyamide 6 composites through mixture of sizing agent and reduced graphene oxide coating*,
   Beom Gon Cho, **Shalik Ram Joshi**, Jong Hun Han, Gun-Ho Kim, and Young Bin Park
   Composites Part A, 149, 106521, (2021)

3. *Low cost synthesis of highly crystalline graphene oxide with tunable electrical and thermal properties*,
   Shalik Ram Joshi, Jaekyo Lee, and Gun-Ho Kim
   Materials Letters, 292, 129649, (2021)

4. *Tuning photo-response and electronic behaviour of graphene quantum dots synthesized via ion irradiation* ,
   Ashis Kr. Manna, Simeon Gilbert, **Shalik R. Joshi**, Takashi Komesu, Peter Dowben, Shikha Varma
   Physica B: Condensed Matter, 613, 412978, (2021)

5. *Enhanced Mechanical and antibacterial properties of nanocomposites based on poly(vinyl alcohol) and biopolymer derived reduced graphene oxide*,
   Beom-Gon Cho, **Shalik Ram Joshi**, Shinkwan Kim, Young-Bin Park and Gun-Ho Kim
   Polymers, 13, 615, (2021)

6. *Tacticity dependent cross-plane thermal conductivity in electrostatically engineered amorphous polymers*,
   Jaekyo Lee, Yangmu Kim, **Shalik Ram Joshi**, Min Sang Kwon, and Gun-Ho Kim
   Polymer Chemistry, 12, 975, (2021)

7. *A general approach to composites containing nonmetallic fillers and liquid gallium*,
   Chunhui Wang, Yan Gong, Benjamin V. Cunning, Seunghwan Lee, Quan Le, **Shalik Ram Joshi**, Onur Buyukcakir, Hanyang Zhang, Won Kyung Seong, Ming Huang, Meihui Wang, Jaeseon Lee, Gun-Ho Kim, Rodney S. Ruoff
   Science Advances, 7, 3767, (2021)

8. *Photoactive antiviral face mask with self-sterilization and reusability*,
   Sumit Kumar, Mamata Karmacharya, **Shalik Ram Joshi**, Oleksandra Gulenko, Juhee Park, Gun-Ho Kim, and Yoon-Kyoung Cho
   Nano Letters, 21, 337-343, (2021)

9. *Structural and optical properties of multilayered undoped and cobalt doped TiO_2 thin films*, Anupama Chanda, **Shalik Ram Joshi**, V.R. Akshay, Shikha Varma, Jai Singh, M. Vasundhara, and Prashant Shukla
Applied Surface Science, 536, 147830, (2021)

10. *Low-cost and fast-response resistive humidity sensor comprising biopolymer derived carbon thin film and carbon microelectrodes*,
Shalik Ram Joshi, Beomsang Kim, Shin-Kwan Kim, Gun-Ho Kim, Heungjoo Shin, Wonho Song and Kibog Park
Journal of Electrochemical Society, 167, 147511, (2020)

11. *Direct growth of thermally reduced graphene oxide on carbon fiber for enhanced mechanical strength*,
Shalik Ram Joshi, Beom-Gon Cho, Young-Bin Park, and Gun-Ho Kim
Composite Part B, 193, 108010, (2020)

12. *Highly ordered and dense thermally conductive graphitic films from a graphene oxide-reduced graphene oxide mixture*,
Abozar Akbari, Benjamin V. Cunning, **Shalik Ram Joshi**, Chunhui Wang, Shahana Chatterjee, Vijayakumar Modepalli, Collin Cahoon, Pavel Bakharev, Gun-Ho Kim, and Rodney S. Ruoff
Cell Matter, 2, 1-9, (2020)

13. *Low cost synthesis of reduced graphene oxide using bio-polymer for influenza virus sensor*,
Shalik Ram Joshi, Abhinav Sharma, Gun-Ho Kim, and Jaesung Jang
Materials Science and Engineering C, 108, 110465, (2020)

14. *Ultra stiff, strong, and highly thermally conductive crystalline graphitic films with mixed stacking order*,
Bin Wang, Benjamin V. Cunning, Na Yeon Kim, Fariborz Kargar, SunYoung Park, Zhancheng Li, **Shalik R. Joshi**, Li Peng, Vijayakumar Modepalli, Xianjue Chen, Yongtao Shen, Won Kyung Seong, Youngwoo Kwon, Jeongsu Jang, Haofei Shi, Chao Gao, GunHo Kim, Tae Joo Shin, Kwanpyo Kim, JuYoung Kim, Alexander A. Balandin, Zonghoon Lee, and Rodney S. Ruoff
Advanced Materials, 1903039, (2019)

15. *The effect of Ti^+ ion implantation on the anatase-rutile phase transformation and resistive switching properties of TiO_2 thin films*,
Ashis Manna, A. Barman, **Shalik R. Joshi**, B. Satpati, P. Dash, Ananya Chattaraj, S. K. Srivastava, P. K. Sahoo, A. Kanjilal, D. Kanjilal, and Shikha Varma
Journal of Applied Physics, 124, 155303, (2018)

16. *Electronic structure of Pr_2MnNiO_6 from x-ray photo-emission, absorption and density functional theory*,

Padmanabhan Balasubramanian, **Shalik Ram Joshi**, Ruchika Yadav, Frank M. F. de Groot, Amit Kumar Singh, Avijeet Ray, Mukul Gupta, Ankita Singh, Satyendra Maurya, Suja Elizabeth, Shikha Varma, Tulika Maitra, and Vivek Malik
Journal of Physics: Condense Matter, 30, 435603, (2018)

17. *Investigation on structural, morphological and optical properties of Co-doped ZnO thin films*,
Prashant Shukla, Shristi Tiwari, **Shalik Ram Joshi**, V. R. Akshay, M. Vasundhara, Shikha Varma, Jai Singh, and Anupama Chanda
Physica B: Condensed Matter, 550, 303-310, (2018).

18. *Anisotropic super-paramagnetism in cobalt implanted rutile-TiO_2 single crystals*,
Shalik Ram Joshi, B. Padmanabhan, Anupama Chanda, Neeraj Shukla, V. K. Malik, D. Kanjilal and Shikha Varma
Journal of Magnetism and Magnetic Materials, 465, 122-127, (2018).

19. *Formation of anisotropic nanostructures on rutile TiO_2 (110) surfaces and their photo-absorption properties*,
Vanaraj Solanki, **Shalik Ram Joshi**, Indrani Mishra, Dinakar Kanjilal and Shikha Varma
Metallurgical and Materials Transactions A, 49, 3117-3121, (2018).

20. *Structural and magnetic study of undoped and cobalt doped TiO_2 nanoparticles*,
Anupama Chanda, Kumarmani Rout, M. Vasundhara, **Shalik Ram Joshi** and Jai Singh
RSC Advances, 8, 10939-10947, (2018).

21. *Study of structural, optical and magnetic properties of cobalt doped ZnO nanorods*,
Anupama Chanda, Shipra Gupta, **Shalik Ram Joshi**, Vasundhara M, Geeta R. Mutta, V. Chandra, Jai Singh,
RSC Advances, 7, 50527, (2017).

22. *A study of electron and thermal transport in layered Titanium disulphide single crystals*,
Dhavala Suri, Siva Vantari, **Shalikram Joshi**, Kartik Senapati, Pratap Kumar Sahoo, Shikha Varma and Ram Shanker Patel,
J. Phys.:Condens. Matter, 29, 485708, (2017).

23. *Scaling studies of self-affine nanopatterned TiO_2 surfaces created via ion implantation*,
Shalik Ram Joshi, Anupama Chanda, D. Kanjilal and Shikha Varma
Thin Solid Films, 639, 145-151, (2017).

24. *Complex damage distribution behaviour in cobalt implanted rutile TiO_2 (110) Lattice*,
Shalik Ram Joshi, B. Padmanabhan, Anupama Chanda, S. Ojha, D. Kanjilal and Shikha Varma,
Nuclear Instruments and Methods in Physics Research B, 410, 114-121 (2017).

25. *Optical studies of cobalt implanted rutile TiO_2(110) surface*,
Shalik Ram Joshi, B. Padmanabhan, Anupama Chanda, Indrani Mishra, V. K. Malik, N. C. Mishra, D. Kanjilal and Shikha Varma,
Applied Surface Science, 387, 938-943, (2016).

26. *Effect of cobalt implantation on structural and electronic properties of rutile TiO_2(110) surface*,
Shalik Ram Joshi, B. Padmanabhan, Anupama Chanda, V. K. Malik, N. C. Mishra, D. Kanjilal and Shikha Varma,
Applied Physics A, 122, 713 (2016).

27. *Kinetic monte carlo simulations of self organized nanostructures on Tantalum surface fabricated by low energy ion sputtering*,
Shalik Ram Joshi, Trilochan Bagarti and Shikha Varma,
Surface Science 641, 170-173 (2015).

28. *Conducting polymer PEDOT:PSS: An emerging material for flexible and transparent electronics*,
Anupama Chanda, **Shalik Ram Joshi**, Rakesh Sahoo, Shikha Varma, Kwangsoo No,
Sensors & Transducers, Vol. 210, Issue 3, March 2017, pp. 29-31

29. *Oxygen vacancy mediated enhanced photo-absorption from ZnO (0001) nanostructures fabricated by atom beam sputtering*,
Vanaraj Solanki, **Shalik Ram Joshi**, N.C. Mishra, D.K. Awasthi and Shikha Varma,
Journal of Applied Physics, 120, 054303, (2016).

30. *Low energy ion irradiation of TiO_2(110)- understanding evolution of surface morphology and scaling studies*,
Indrani Mishra, **Shalik Ram Joshi**, Subrata Majumder, Ashis Kumar Manna and Shikha Varma,
Radiation Effects and Defects in Solids, 171, 594-605, (2016).

31. *Room temperature superparamagnetism in rutile TiO_2 quantum dots produced via ECR sputtering*,
Vanaraj Solanki, Indrani Mishra, **Shalik Ram Joshi**, P. Mishra, P. Dash, N. C. Sharma, Dinakar Kanjilal and Shikha Varma,
Nuclear Instruments and Methods in Physics Research B, 365, 82-85 (2015).

32. *Ion beam induced nanodots formation from Au/Si thin films on quartz surface*,
D. P. Datta, V. Siva, A. Singh, **Shalik Ram Joshi**, D. Kanjilal, P. K. Sahoo,
Nuclear Instruments and Methods in Physics Research B, 379, 48-51, (2015).

33. *Size-dependent optical properties of TiO_2 nanostructures*,
Vanaraj Solanki, Subrata Majumder, Indrani Mishra, **Shalik Ram Joshi**, Dinakar Kan-

jilal and Shikha Varma,
Radiation Effects and Defects in Solids 168, 518-524 (2013).

List of Patent

- ▷ **Carbon Fiber composite and method of manufacturing the same**,
  Y. B. Park, Gun-Ho Kim, Beom-gon Cho, and **Shalik Ram Joshi**,
  Korean Patent Application Number (1020190105881) and Date (03-09-2020)

Conference Proceedings

- ▷ *Band gap Engineering, Enhanced UV-Vis Absorbance and Higher PL Emission from Ion Beam Modified and Nanodot Patterned Rutile TiO_2 (110) Surfaces*,
  Subrata Majumder, Vanaraj Solanki, Indrani Mishra, **Shalik Ram Joshi**, Dinakar Kanjilal, and Shikha Varma
  Conference Proceedings : Tenth International Conference on Advances and Trends in Engineering, At Montreal, Canada

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Seminars and Talks Given

- ▷ Studies of Magnetism and Photo absorption Properties on Cobalt Implanted TiO_2 & KMC Simulation studies on Ion Beam Patterned Tantalum Surfaces, Institute of Physics, Bhubaneswar, India, December-2016.
- ▷ Radiation Induced Damage in Single Layer Graphene Using Medium and Swift Heavy Ion Irradiation, 58th Accelerator User Workshop, Inter-University Accelerator Center, New Delhi, 2015.
- ▷ X-Ray Photo-electron Spectroscopy Studies on Patterned Mica Surfaces, Institute of Physics, Bhubaneswar, India, July-2014.
- ▷ Introduction to Random Deposition Model and its Universality Class, Institute of Physics, Bhubaneswar, India, Oct-2013.
- ▷ Patterning of Muscovite Mica using Low Energy Ion Beam Sputtering, Institute of Physics, Bhubaneswar, India, July-2013.
- ▷ Height Height Correlation Studies of Ion Irradiated Rutile $TiO_2(110)$ Surface, Institute of Physics, Bhubaneswar, India, July-2012.
- ▷ Thin Film Characterization of ZnO by Using X-Ray Photo electron Spectroscopy, Institute of Physics, Bhubaneswar, India, June-2011.

Schools/Symposium/Conferences Attended

- ▷ Workshop on Frontiers in Condensed Matter Physics, Institute of Physics, Bhubaneswar, Feb 22-27, 2016.
- ▷ Emerging Trends in Advanced Functional Materials, Institute of Physics, Bhubaneswar, India, Jan 18-21, 2016.
- ▷ Workshop in Low Energy Ion Beam Facility (LEIBF), Inter University Accelerator Center, New Delhi, India, Nov, 3-4, 2015.
- ▷ Current Trends in Condense Matter Physics, National Institute of Science Education and Research(NISER), Bhubaneswar, India, 19th-22nd February, 2015.
- ▷ Swift Heavy Ions in Material Engineering and Characterization(SHEMAC), Inter University Accelerator Center, New Delhi, India, Oct, 14-17, 2014.
- ▷ International School on Ion Beams in Material Science, Inter University Accelerator Center, New Delhi, India, Oct, 8-13, 2014.
- ▷ International Conference on Physics of Surfaces and Interfaces(PSI), Puri, Bhubaneswar, India, Feb 24-28, 2014.
- ▷ Advanced School on High Resolution Transmission Electron Microscopy, Institute of Physics, Bhubaneswar, India, March, 4-8, 2013.
- ▷ International Conference and Workshop on Nanostructured Ceramics and other Nanomaterials, University of Delhi, March, 13-16, 2012.
- ▷ Lectures on Photo-emission and Workshop on Photo-emission Studies of Advanced Materials, Institute of Physics, Bhubaneswar, December, 8-13, 2011.
- ▷ Workshop on Electron Microscopy, Institute of Physics, Bhubaneswar, India, November, 23-25, 2011.

Poster Presented

- ▷ Anisotropic Magnetism in Cobalt Implanted Rutile TiO_2 (110), Shalik Ram Joshi, B. Padmanabhan, Anupama Chanda, Neeraj Shukla, V. K. Malik, D. Kanjilal, and Shikha Varma, Emerging Trends in Advanced Functional Materials (ETAFM), Institute of Physics, Bhubaneswar, India, Jan 18-21, 2016.

- ▷ Kinetic Monte Carlo Simulations of Self Organised nanostructures on Tantalum Surface by Low Energy Ion Irradiation, Shalik Ram Joshi, Trilochan Bagarti and Shikha Varma, Workshop in Low Energy Ion Beam Facility (LEIBF), Inter University Accelerator Center, New Delhi, India, Nov, 3-4, 2015.
- ▷ Formation of Well Aligned Nanostructures on Mica by Low Energy Ion Beam Sputtering, Shalik Ram Joshi, Indrani Mishra, Vanaraj Solanki and Shikha Varma, Swift Heavy Ions in Material Engineering and Characterization(SHEMAC), Inter University Accelerator Center, New Delhi, India, Oct, 14-17, 2014.
- ▷ Surface Studies of Nanostructures Formation on Mica Surface by Low Energy Ion Irradiation, Shalik Ram Joshi, Indrani Mishra, Vanaraj Solanki and Shikha Varma, International Conference on Physics of Surfaces and Interfaces(PSI), Puri, Bhubaneswar, India, Feb 24-28, 2014.

Extra Curricular Activities

Teaching Experience
I have been involved in teaching since my graduation. I have taught many high school students (10th and 12th) till my post-graduation in Physics on a part time basis. I have also taught in a reputed school in New Delhi, India, as a Post Graduate Teacher (Class-12) for Physics a year, before joining PhD at Institute of Physics, Bhubaneswar, India.

Scientific Activities
I have also been involved in various outreach activities conducted by our institute. This includes teaching undergraduate, postgraduate and high school students, about research activities going on our institute. This also includes giving them an overview of different scientific instruments which we use in our research work, in a very fundamental way.

Social Activities
I have also formed a social club, named as Zariya, with the help of our scholars. Here, we help underprivileged kids from nearby areas of our institute, by giving them basic education through personal interaction weekly (3 hours per week) basis. We thereafter also admit them to different schools so that they can get formal education thereafter.

References

1. Dr. Kallol Roy,
   Assistant Professor,
   Institute of Computer Science,
   University of Tartu, Tartu, Estonia
   E-mail: kallol.roy@ut.ee
   Tel: +372-560-514-80

2. Prof. Shikha Varma,
   Professor,
   Institute of Physics,
   Sachivalaya Marg, Bhubaneswar- 751005.
   E-mail: shikha@iopb.res.in
   Tel: +91-674-230-6410

3. Prof. Young-Bin Park,
   Professor,
   Department of Mechanical Engineering,
   Ulsan National Institute of Science and Technology (UNIST),
   Ulsan 44919 Republic of Korea,
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