Jitendra K. Tripathi (Ph.D.) **Nuclear Physics Institute of the Czech Academy of Sciences**
Senior Scientist **Rez 292, 250 68 Husinec, Czech Republic**
https://www.ujf.cas.cz/en/departments/department-of-neutron-and-ion-methods/people/lnam.html
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RESEARCH EXPERTISE and INTEREST AREA

- **Surface Science**
- **Materials Science**
- **In-situ Ultra-thin Film & Multilayer Growth and Characterizations**
- **Ion beam Irradiation, Synthesis, Modification, Analysis of Materials**
- **Nuclear Fusion**
- **Plasma Facing Materials**
- **Laser Materials interactions**
- **Epitaxial Growth & Self-assembly in Transition Metal Silicides**
- **Functional Nanostructure and Nanoscience**
- **Scalable Nanomanufacturing**
- **Spintronics and Nanomagnetism**
- **2D Materials**

EDUCATION

Ph. D. Physics (Materials Science /Expt. Condescend Matter Physics) 2006

Banaras Hindu University INDIA

Thesis*:* A Study on Magnetic Metal/Silicon Interface Devices; with and without Swift Heavy Ion Irradiation

Key feature of Ph.D. Thesis: Major impacts of this work lie in spintronics, where information is carried by electron-spin rather than by electronic-charge. I intensively studied GMR in various Ferromagnetic metal (FM)/ Semiconductor (SC) bilayers and reported ~2400% GMR in Fe/Si, **First time**. For spin-injection in FM/SC, most straight forward approach is the formation of an ohmic contact between FM & SC, anticipating a spin-polarized current in SC. However, typical metal-SC ohmic contacts result from heavily doping of SCs, leading to spin-flip scattering and loss of the spin polarization. I overcame such losses by tailoring FM/SC interfaces using **S**wift **H**eavy **I**on (**SHI**) irradiation.

MS, Physics 1999
C.S.J.M. University Kanpur, INDIA

BS, Physics, Math, Chemistry, 1997
C.S.J.M. University Kanpur, INDIA

APPOINTMENTS

Nuclear Physics Institute of the Czech Academy of Sciences, CZECH REPUBLIC

Senior Scientist **2026 – present**

Purdue University, USA

Research Scientist Center for materials under extreme environment (CMUXE) **2023 - 2025**

- **Leadership: Group Leader** Surface science & nanostructure and Laser material interaction groups

- **Performance testing of current PFMs (W-based materials) under relevant normal & abnormal conditions:** These studies involve several tasks including (but not limited):

(a) Surface morphology evolution, deterioration, Fuzz formation and growth mechanisms on PFMs under relevant fusion environments and appropriate beams composition.
  - Low-energy high-fluence D^+ and He^+ ion beam irradiations separately at elevated sample temperature (steady state heat load up to 1473K).
  - In-situ combined dual simultaneous ion beam irradiation (D^+ & He^+), transient (ELMs condition), and steady state heat loading to resemble near ideal ITER operating conditions **(unique *state-of-the-art in-situ* UHV facility designed and developed by me, recently, where we can achieve Near Ideal Nuclear Fusion environments at laboratory scale)**.

(b) In-situ erosion and mitigation studies PFM surfaces (both fuzzy & non-fuzzy)
  - Simultaneous transient (ELMs with different intensity and frequency) at steady state heat loading.
  - *In-situ* eroded mass measurement using both high-sensitivity QCM and witness plate.

(c) Detailed D and He retention and desorption studies using thermal desorption spectroscopy (TDS)
  - Post D^+ and He^+ ion irradiations
  - Post sequential (He^+ ion followed by D^+ ion and D^+ ion followed by He^+ ion irradiations).
  - Post simultaneous dual ion beam irradiation (D^+ and He^+ ions)

(d) Erosion, migration, as well as depth analysis using laser-induced breakdown spectroscopy (LIBS)
  - In-situ depth analysis including novel ideas in microstructural characterization
  - Ex-situ dual pulse D/fuel retention studies

- **Performance testing of recently proposed alternative PFMs: W based alloys (W-Ta, W-Re), smart alloys, and W fiber-reinforced W (W_f/W) in near ideal ITER operating conditions.**
- Thin films and coatings and Defect engineering in wide band gap semiconductors under low energy ion exposers
- Scalable nanomanufacturing (nano-cones, -dots, -arrays) and Tailoring surface porosity in transition metal oxides
- Low energy ion beam irradiation studies on 2D Transition Metal Dichalcogenides (2D TMDC) and Ti Based Maxene
- Transition metal based Heusler heterostructures for spintronics applications.
- Writing and submitting research proposals, technical reports, manuscripts
- Organizing and conducting scientific meetings, seminars, talks, and workshops.
- **Mentoring and supervising students (UG, MS, Ph.D.)**
- **Training students (UG, MS, Ph.D.):** Microscopy (AFM, SEM, STM, FIB), Spectroscopy (XPS, UPS, AES, ISS, TDS), In-situ thin film growth (e-beam, RF sputtering, IBAD, PLD) and characterizations, Advanced in-situ UHV experimental methodology and instrumentation, Ion beam irradiation and analysis, Laser, Plasma and Materials interaction & processing
- **Laboratory In-charge** *state-of-the-art in- & ex-situ* UHV laboratories: Interaction of materials with particles and components testing (IMPACT), Ultra high flux irradiation (UHFI), Particle radiation interaction with matter experiments (PRIME), Laser produced plasma (LPP), High energy density physics (HEDP), Discharge produced plasma (DPP)
- Designing, developing and troubleshooting advanced *in-situ* UHV facilities and performing critical experiments and testing materials and devices.

SRM Institute of Science & Technology, Kattankulathur, INDIA

Assistant Professor Physics & Nanotechnology **2020 – 2023**

- Teaching students (Ph.D., M.Tech., B.Tech.)
- Conducting research and publishing papers in academic journals.
- Supervising Ph.D. students
- Writing and submitting research proposals to secure funding for research and development.
- Representing the institution at conferences and delivering presentations

- Participating in faculty and departmental meetings and voicing concerns or providing suggestions for improvement.

Focused activities (major)

Research

- Transition metal dichalcogenides (TMDC) based diluted magnetic semiconductors (DMS) for spintronics applications.
- Transition metal based Heusler heterostructures for spintronics applications.

Teaching (Ph.D., M.Tech., B. Tech.) (Theory & Lab, both semesters)

- Advanced Characterization of Nanomaterials (18NTC107J)
- Nanoscale Materials: Synthesis and Characterization (20NTC502J)
- Physics and Chemistry of Nanomaterials (20NTC503J)
- Advanced data analysis & simulations for nanomaterial surface characterizations (***value added course***)
- Semiconductor Physics (18PYB103J)
- Semiconductor Physics and Computation Methods (21PYB102J)

Purdue University, USA

Post-Doctoral Research Associate	Center for materials under extreme environment (CMUXE)	**2016 – 2019**
Senior Postdoc Research Associate	Center for materials under extreme environment (CMUXE)	**2015 – 2016**
Post-Doctoral Research Associate	Center for materials under extreme environment (CMUXE)	**2013 – 2015**

- **Leadership: Group Leader (2013 - 2019)** Surface science & nanostructure group
- I investigated clear temperature window (TW) for Mo fuzz formation for Mo PFMs under low energy high flux He ion exposer environment in extreme conditions. The investigated TW is considerably lower and significantly narrower than that of the W, showing a compelling advantage for Mo PFMs than that of the W, under similar nuclear fusion conditions, towards developing an alternative PFMs to W for current and future DEMO reactors. I studied the role of C impurities on Mo and W PFMs morphology evolutions as well. Mo and W fuzz formation TW in future DEMO reactors could be considerable as well as during unexpected abnormal ITER operations too. In these fusion devices, tiny amounts of C seeding might be considered, not just for the benefits of radiative cooling, but also to inhibit fuzz formation. Additionally, small amounts of C in the DEMO reactors may not cause a retention problem due to the extremely high operational temperature.
- I investigated remarkable surface morphology changes, and early-stage of Ta “fuzz” evolutions at higher fluence threshold than that of the W. I have shown, that while Ta may have less desirable bulk properties (*e.g.,* thermal conductivity) when compared to W, its higher resilience to He ion-induced surface modification clearly suggests that surface, thermal, and mechanical properties may not degrade as quickly in extreme fusion environments; this quality will be a redeeming factor for Ta as an alternative PFMs material to W.
- I investigated the synergetic effect induced by low energy dual ion beams (He and D) on W and W-Ta alloys at high (1223 K) and low (523 K) temperatures for surface morphological changes and W fuzz evolutions. Additionally, minor irradiation tolerance enhancement in the performance of the W-Ta alloy was also observed. These results have very high impact in nuclear fusion applications, and most importantly to the best of our knowledge this is the first report on “microstructure evolution in W and W-Ta alloys during simultaneous and sequential (He^+ and D^+) ion irradiation in in-situ conditions, for nuclear fusion relevant applications.

- One hand I have confirmed that a heat load of 1.5 MJ m^{-2} with 200 laser pulse count can result in almost complete Mo fuzz mitigation (first time)! In-situ Mo fuzz mass loss measurements (due to transient heat loading) using high resolution QCM), confirmed significant Mo fuzz mass deposition on QCM. And on other hand I discovered the structural damage during off-normal events on W fuzzy surface by transient heat loading using ms Laser and Electron Beam bombardments in a fusion environment. I discovered the melt layer growth and erosion during ELM-like heat loading on Mo PFMs. My study demonstrates that due to the apparent exponential increment in material loss with increasing ELM intensity, future DEMO fusion devices should incorporate ELM mitigation techniques to keep intensities below 1.0 MJ m^{-2} .
- I tuned the surface-porosity of V_2O_5 and Nb_2O_5 photocatalytic materials, using low-energy high-flux helium ion irradiation at elevated temperatures. We observed subsurface He bubble formation and elucidated potential driving mechanisms for nanostructure evolution. Our investigations show significant surface modification for all tested irradiation conditions; the resulting surface structure size and geometry have a strong dependence on both sample temperature during irradiation and total ion fluence. The top-down approach, used in these studies for tuning the surface-porosity by me, is unique, novel and innovative. It not only produces the surface-pores having homogeneous population, well defined geometrical shape, size (nm - μm range), the desired number density, but also gives the guaranty for relatively better contact between different neighbor crystallites and avoids the electrical conductivity limitations, if required.
- I focused on wideband gap cadmium zinc telluride (CdZnTe) or CZT compound semiconductor, key materials for X- and γ-ray detectors, as well. Crystallographic extended defects and associated impurities viz., dislocations, twin- and subgrain-boundaries, dislocation networks, Te precipitates and /or inclusions, and non-uniform Zn composition inthe grown CZT crystals, are the major factors limiting the performance of CZT detectors. These defects and impurities are sufficient to introduce enough deep level centers, acting as traps and recombination centers for mobile charge carriers in the CZT detectors, towards degrading its performance, energy resolution, efficiency, and long-term reliability. In defect free CZT crystals, these trapping centers would be gradually distributed throughout the crystals surface homogeneously, so that the trapped charge could be corrected electronically. Using in-situ ion-irradiation techniques I succeed in removing such crystallographic extended defects and associated impurities, in particular Te inclusion and /or defects, completely from CZT crystal surface.

Additional major activities and responsibilities during this tenure are as below

- Writing and submitting research proposals, technical reports, manuscripts
- Mentoring and Supervising students (UG, MS, Ph.D.)
- Training students (UG, MS, Ph.D.): Microscopy (AFM, SEM, STM, FIB), Spectroscopy (XPS, UPS, AES, ISS, TDS), In-situ thin film growth (e-beam, RF sputtering, IBAD, PLD) and characterizations, Advanced in-situ UHV experimental methodology and instrumentation, Ion beam irradiation & analysis, Laser, Plasma and Materials interaction & processing
- Organizing and conducting scientific meetings, seminars, talks, and workshops.
- **Laboratory In-charge (2013 - 19)** *state-of-the-art in- & ex-situ* UHV laboratories: Interaction of materials with particles and components testing (IMPACT), Ultra high flux irradiation (UHFI), Particle radiation interaction with matter experiments (PRIME).
- Designing, developing, and troubleshooting advanced in-situ UHV facilities and performing critical experiments and testing materials and devices

Focused research activities (major)

- Ion beam irradiation, synthesis, modifications, and analysis of materials
- Developing alternative Plasma Facing Materials (PFMs) to Tungsten
- Testing performances of PFMs in nearly Ideal Nuclear Fusion (NF) environments. A unique experimental UHV facility designed and developed by me, where we can achieve nearly ideal NF conditions at laboratory scale.
- Erosion and Mitigation studies in PFMs in nearly Ideal NF environments

- Thermal Desorption Spectroscopy (TDS)
- Thin Films and Coatings
- Defect engineering in wide band gap semiconductors via. low energetic ions
- Scalable Nanomanufacturing: Nanocones, Nanodots and Nanoarrays
- Tailoring surface porosity in Transition Metal Oxides
- Laser Materials interaction and processing
- Two-dimensional Transition Metal Dichalcogenides (2D TMDC)

Tel Aviv University, Israel

Post-Doctoral Fellow School of Mechanical Engineering **2009 – 2013**

- **Performing in-situ Intensive Studies in multi-purpose UHV variable temperature (25 – 1500K) scanning probe microscopy (SPM) cluster tool (both STM & AFM modes):** equipped with materials evaporation (directly on SPM stage) growth & heat treatments along with subsequent analyses, STM, STS, LEED, RHEED, AES and effusion cell in real -time & -space conditions.
- Maintaining, Troubleshooting, and instrumentation in multipurpose UHV variable temperature SPM cluster tool (both STM & AFM modes)
- Writing and submitting Research proposals/grants, and technical reports
- Organizing & conducting Scientific Meetings, Seminars, Talks, and workshops
- Mentoring and Supervising students (UG, MS)
- Training students (UG, MS): Microscopy (AFM, STM, SEM), Spectroscopy (XPS, UPS, AES, STS), In-situ ultra-thin film growth (e-beam, MBE) and characterization (STM, STS, LEED, RHEED, AES, mass spectroscopy), Magnetic properties (VSM, SQUID)

Focused research activities (major)

- Heteroepitaxial Growth: Self-assembled Transition Metal Silicide
- Electronic Growth in Transition Metal Silicide Heterostructures
- Monitoring kinetic processes in Transition Metal Silicide growth: Nucleation, Growth, Phase transitions, and metal-semiconductor reactions, as they happen and with atomic resolution.
- Tuning size, shape, and self-ordering of magnetic Nanodot, Nanostripe, and Nanoarrays in in-situ condition.
- Transition Metal Silicide Nanostructures: structural, morphological & magnetic properties

Key Achievements:

- In-situ monitoring of kinetic processes during solid state reactions: Nucleation, Growth, Phase transitions, and Metal-Semiconductor reactions, as they happen and with atomic resolution.
- Electronic growth (transformation from 3D structures to 2D QWs of only certain allowed thicknesses "*magic heights*") in Transition Metal Silicide hetrerostructures.
- Synthesis - Structure - Properties "Holy Grail" of Materials Science: Effect of Shape, Size, and Mesoscopic ordering on Magnetic properties of Transition Metal Silicide Nanostructure arrays
- Tailoring desired properties in self-assembled functional nanostructure arrays (quantum dots and wires, nano-contacts, nano-stripes, nano-magnets, etc.)

Helmholtz-Zentrum Dresden-Rossendorf, Germany

Visiting Scientist Helmholtz-Zentrum Dresden-Rossendorf (3 month) **2008 – 2008**

- Performing noble gas ion irradiation (10 - 150 keV energy using 40 kV and 200 kV ion implanters) in ultrathin Co/Pt and Pt/Cr/Co multilayers

- Structural, Morphological, and Magnetic property characterizations of pre- and post-irradiated ultrathin Co/Pt and Pt/Cr/Co multilayers
- Performing TRIDYN_HZDR simulations

Key Achievements:

Tuning magnetic properties of ultra-thin Pt/Cr/Co multilayers via. keV energy helium ion irradiation.

Institute of Physics, Bhubaneswar, India

Post-Doctoral Fellow Institute of Physics, Bhubaneswar **2007 – 2008**

- Intermediate energy (1 - 2 MeV @ 3 MV Tandem Pelletron Accelerator) ion irradiation in materials
- Nanomagnetism and Spintronics
- Tuning magnetic and structural properties of Co/Pt and Pt/Cr/Co multilayers using intermediate energy ion irradiation
- Tuning magnetic and structural properties of Pt/Cr/Co multilayers using thermal annealing in high vacuum

Key Achievements:

I investigated that depending upon ion energy, species, other implantation parameters, and even the area of the beam spot, one can pattern ultra-thin Co/Pt and Pt/Cr/Co multilayers towards their possible application in high-density perpendicular magnetic recording (PMR) media.

Babu Banarasi Das University, Lucknow, India

Lecturer Department of Physics (3 month) **2006 – 2007**

Banaras Hindu University, India

Project Associate Department of Physics **2004 – 2006**
Study on magnetic metal/ Semiconductor Interface

Banaras Hindu University, India

Junior Research Fellow Department of Physics **2000 – 2001**

The study of electronic interfaces from XPS

AWARDS AND HONORS

- **Collaborative Research Scheme (CRS) Project of UGC-DAE CSR (CRS/2021-22/01/390),** **2022**
  UGC-DAE CSR Indore Centre, **INDIA**: *Monolayer Diluted Magnetic Molybdenum Disulfide (MoS_2) Semiconductors for Spintronics Applications*
- **GOLD MEDAL** (best research presentation, in Nuclear Fusion), SRM-IST, **INDIA** **2021**
- **Top 1% Peer Reviewer in Physics (**Publons- Web of Science) **2018**
- **Outstanding Contribution in Peer Review** **2018**
- Travel Award, Purdue Postdoctoral Association Purdue University, **USA** **2018**
- Travel Award, Purdue Postdoctoral Association, Purdue University, **USA** **2017**

- **Visiting Scientist** at Helmholtz-Zentrum Dresden-Rossendorf, **GERMANY** **2008**
- Travel Award, Council of Scientific & Industrial Research, **INDIA** **2008**
- Travel Award, Department of Science and Technology, **INDIA** **2008**
- **Project Associate Fellowship, Banaras Hindu University**, **INDIA** **2004**
- **Junior Research Fellowship, Banaras Hindu University**, **INDIA** **2000**

Research Grant

- **Collaborative Research Scheme (CRS) Project of UGC-DAE CSR (CRS/2021-22/01/390):** Monolayer Diluted Magnetic Molybdenum Disulfide (MoS_2) Semiconductors for Spintronics Applications

  Funding Agency: UGC-DAE CSR Indore Centre, **INDIA**

  Funding Amount: ₹45K/year (for 3 years) + Full access for using the facilities available at UGC-DAE CSR Indore India

  Funding duration: 3 years (April 1, 2022 – March 31, 2025)

  Investigator: **Jitendra Kumar Tripathi (PI)**

  Current Status: Moved to Purdue, as Research Scientist, in February 2023. Unused funds returned.

KEY SKILLS and EXPERTISE

Surface Science Characterization

- Expertise in advanced surface analysis techniques:
  - **Scanning Probe Microscopy (SPM):** Scanning Tunneling Microscopy (STM), Atomic Force Microscopy (AFM)
  - **Electron-Based Techniques:** Scanning Electron Microscopy (SEM), Field Emission SEM (FE-SEM), Energy Dispersive X-ray Spectroscopy (EDX), Focused Ion Beam (FIB), Low Energy Electron Diffraction (LEED), Reflection High Energy Electron Diffraction (RHEED)
  - **Photoelectron & Ion Scattering Spectroscopy:** X-ray Photoelectron Spectroscopy (XPS), Ultraviolet Photoelectron Spectroscopy (UPS), Auger Electron Spectroscopy (AES), Low Energy Ion Scattering Spectroscopy (LEISS)
  - **X-ray Techniques:** X-ray Reflectivity (XRR), X-ray Diffraction (XRD)
- Extensive experience with **Omicron variable-temperature (25 – 1500 K) UHV-SPM**, integrating STM, AFM, LEED, RHEED, AES, and mass spectrometry for in-situ characterization of epitaxial growth.

Material Growth & Nanofabrication

- **In-situ thin film deposition and nanostructure fabrication using:**
  - **Epitaxial Growth & Deposition Techniques:**
    - E-beam evaporation (3-pocket mini evaporator for in-situ STM/AFM studies)
    - Pulse Laser Deposition (PLD)
    - RF Magnetron Sputtering
    - Ion Beam Assisted Deposition (IBAD)
    - Ion Beam Sputter Deposition (IBSD/IBD)

- **2D Material Processing:**
  - Laser and mechanical exfoliation of 2D materials

- Real-time growth mechanism monitoring *via.,* STM at variable temperatures, enabling atomic-scale insight into nucleation, phase transitions, and surface reactions.

Electrical Transport & Magnetoresistance Measurements

- Current-Voltage (I-V) and Capacitance-Voltage (C-V) measurements (LN_2 – 300 K).
- Magnetoresistance Studies:
  - Giant Magnetoresistance (GMR) and Tunnel Magnetoresistance (TMR).

Magnetic Property Characterization

- Magneto-Optical Kerr Effect (MOKE) for thin-film magnetism studies.
- Vibrating Sample Magnetometry (VSM) for bulk and thin-film materials.
- Superconducting Quantum Interference Device (SQUID) Magnetometry for ultra-sensitive magnetic measurements.
- Magnetic Force Microscopy (MFM) for nanoscale magnetic imaging.

Ion Beam Irradiation & Materials Modification

- Expertise in Single- (SIBI) and Dual- (DIBI) Ion Beam Irradiation in extreme environments.
- Developed a unique laboratory-scale near-ideal nuclear fusion environment, integrating DIBI with transient and steady-state heating.
- In-situ ion irradiation with LEISS, XPS, AES, UPS, and thermal desorption spectroscopy (TDS).
- Swift Heavy Ion (SHI) irradiation, using 15-UD Tandem Pelletron Accelerator for modifications in materials.
- Hands-on experience with 3 MV Tandem Pelletron Accelerator for ion beam studies.
- Rutherford Backscattering Spectroscopy (RBS) for depth profiling and composition analysis.

Optical Property Characterization

- Optical Reflectivity measurements for thin-film and bulk material analysis.
- Raman Spectroscopy for phonon and structural characterization.
- Photoluminescence (PL) Spectroscopy for electronic band structure analysis.

Computational Tools & Data Analysis

Experimental Data Processing & Image Analysis

- Graphing & Data Visualization: Origin, MS Excel
- Microscopy Image Processing: ImageJ, SPIP, WSxM, Image-SXM, Gwyddion
- X-ray Reflectivity (XRR) Analysis: Parratt simulation
- XPS, AES, SIMS Data Interpretation: Casa-XPS, XPS PeakFit

Ion Beam & Materials Simulation

- Ion Implantation & Damage Simulation: SRIM/TRIM
- Dynamic Thickness/Composition Evolution in Ion Implantation: TRIDYN_HZDR
- Ion Implantation in Crystalline Materials (Si, Ge, Diamond): Crystal-TRIM

Programming & Computational Modeling

- C/C++ (Intermediate level) for scientific computing and data analysis.

PUBLICATIONS (personal web page , google citation) 84

Google citation **941** **(h-index:18, i10-index: 29)**

(1) PUBLISHED ARTICLES: 78

A) Peer reviewed international Journal articles (Published) 58
B) Edited volumes/ Conference Proceedings **(Published) 19**
C) Book **(Published) 01**

(2) Under review 04

(3) To be submitted (Peer reviewed international Journal articles) **02**

(4) Conference/workshop/symposia participation (talk and/or poster) 56

PUBLISHED ARTICLES: Student mentee/advisees are underscored; * undergraduates

A) Peer reviewed international journal articles: 58

1. Performance of W and W-Re Alloys Exposed to Simulated ELM-like Fusion Events: Thermal Response and Surface Evolution
Tyler E. Ray, *J.C. Johnson, **J. K. Tripathi,** *Matthew Halloran, Ahmed Hassanein
Journal of Nuclear Materials: ***Under review.***

2. Helium plasma irradiation induced fuzz formation and strain evolution in pure W Corresponding
Adil Wazeer; Tyler Ray; **Jitendra Kumar Tripathi**; Zhongxia Shang; Jialong Huang; Abhijeet Choudhury; Yinghang Liu; Chang Xia; Vaibhav Singh; Yexiang Xue; Guang Lin; Tim Graening; Xiao-Ying Yu; Ahmed Hassanein; Haiyan Wang, and Xinghang Zhang
Applied Surface Science ***Under review.***

3. Trion-dependent Resonance Raman Scattering Driven by High-k-dielectric-induced Electron Doping in Monolayer MoS_2
Harish Nanda Arunachalam, T. Perarasan, Santhosh Durairaj, K. Ganesan, Kang Bok Ko, Keun Heo, Senthil Kumar Eswaran, Jaivardhan Sinha, **J. K Tripathi**, S. Chandramohan
Physical Review B ***Under review.***

4. Evolution of interfacial structure and magnetic properties in annealed Ta|CoFeB|MgO|Ta multilayers
T. Perarasan, Dileep Kumar, Mukul Gupta, Pooja Gupta, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
Journal of Alloys and Compounds ***Under review.***

5. Spin–Orbit-Torque-Driven Perpendicular Switching of Interfacial High-Anisotropy Pinning Spins without a Bias Field
T. Perarasan, Harish Nanda Arunachalam, Mani Bharathi Manickavasagam, Priyanka Babu, S. Chandramohan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
Advanced Quantum Technologies *9,* e01000 **(2026)** Download

6. Role of Interfacial High-Anisotropy Pinning on Creation and Annihilation of Skyrmion in Co/IrMn Bilayer
T. Perarasan, Harish Nanda Arunachalam, Mani Bharathi Manickavasagam, Priyanka Babu, S. Chandramohan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
Applied Surface Science 730, 166341 **(2026)** Download

7. Performance of Rhenium Surface Morphology Under Low Energy Helium Ion Irradiation

*J.C. Johnson, Tyler E Ray, **J. K. Tripathi**, Ahmed Hassanein
Journal of Nuclear Materials: 625, 156523***(2026).*** **Download**

8. Performance of W and W-Re alloys under low-energy He^+ ion irradiations in relevant nuclear fusion conditions
Tyler E. Ray, *J.C. Johnson, **J. K. Tripathi**, Ahmed Hassanein
Journal of Nuclear Materials: 619, 156278 **(2026)** **Download**

9. Evolutions of 3D MoS_2 Nanoislands on Monolayer MoS_2 Edges under Low Energy Ion Irradiation
H. Arunachalam, T. Perarasan, S. Durairaj, J. Sinha, Senthil Kumar Eswaran S. Chandarmohan, and **Jitendra Kumar Tripathi**
Journal of Materials Science, **60, 1-17 (2025): Download**

10. Micromagnetic Study of Exchange Bias Effect in Sub-micron Dots of Co_2MnSi Interfaced with Uncompensated IrMn
T. Perarasan, Harish Nanda Arunachalam, S. Chandramohan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
Physica Scripta B: 99, 095972 **(2024): Download**

11. Synergistic effects of W-3Ta exposed to various ELM-like fusion events.
Tyler E. Ray, **J.K. Tripathi**, and A. Hassanein
Nuclear Fusion: 64, 046001**(2024)): Download**

12. Synergistic effect on silicin surface low energy helium ion irradiation at elevated temperatures
N.C. Termini, **J. K. Tripathi**, and A. Hassanein
Thin Solid Film: 738, 140094 **(2023) : Download**

13. Laser-Based Fabrication of Carbon Nanotube–Metal Composites on a Polymer Substrate: Experimental Study and Characterizations
Z. Kang, **J. K. Tripathi**, M. Wang, A. Hassanein, and B. Wu
ASME Journal of Manufacturing Science and Engineering 142, 091007 **(2020) : Download**

14. Influence of dual beam ion irradiation and transient heat loading on tungsten surface morphology and erosion.
G. Sinclair, S. Gonderman, **J.K. Tripathi**, T. Ray, and A. Hassanein
Journal of Nuclear Materials*:* 514, 208 **(2019) : Download**

15. Silicon nanocone structure formation via Low-Energy Helium Ion Sputtering
T. J. Novakowski, **J. K. Tripathi**, and A. Hassanein
Journal Vacuum Science and Technology B: 36, 051202 **(2018) : Download**

16. Effect of ELM pacing on morphology evolution and erosion of tungsten as a plasma-facing material in a fusion environment.
G. Sinclair, S. Gonderman, **J.K. Tripathi**, and A. Hassanein
Journal of Nuclear Materials: 508, 26 **(2018) : Download**

17. Erosion dynamics of tungsten fuzz during ELM-like heat loading
G. Sinclair, **J.K. Tripathi**, and A. Hassanein
Journal of Applied Physics: 23, 133302 **(2018) : Download**

18. Deuterium desorption from ion-irradiated tantalum and effects on surface morphology
T. J. Novakowski, *A. Sundaram, **J. K. Tripathi**, S. Gonderman, and A. Hassanein
Journal of Nuclear Materials: 504, 1 **(2018) : Download**

19. Effects of in-situ dual ion beam (He^+ and D^+) irradiation with simultaneous pulsed heat loading on surface morphology evolution of tungsten-tantalum alloys.
S. Gonderman, **J. K. Tripathi**, G. Sinclair, T. J. Novakowski, T. Sizyuk, and A. Hassanein
Nuclear Fusion: 58, 026016 **(2018) : Download**

20. Effect of Dual Ion Beam Irradiation (Helium and Deuterium) on Tungsten Tantalum Alloys under Fusion Relevant Conditions
S. Gonderman, **J. K. Tripathi**, T. J. Novakowski, T. Sizyuk, and A. Hassanein
Nuclear Materials and Energy: 12, 346 **(2017) : Download**

21. Structural Evoluions of Tungsten Surface Exposed to Low Energy Helium Ion Irradiation by Transient Heat Loading
G. Sinclair, **J. K. Tripathi**, P. K. Diwakar, N. Lemahieu, M. Wirtz, J. Linke, and A. Hassanein
Nuclear Materials and Energy: 12, 405 **(2017) : Download**

22. Melt layer growth and erosion during ELM-like heat loading on plasma-facing components.

G. Sinclair, **J. K. Tripathi**, P. Diwakar, and A. Hassanein
Scientific Reports: 7, article number 12273 **(2017) : Download**

23. The effect of low energy helium ion irradiation on tungsten-tantalum (W-Ta) alloys under fusion relevant conditions
S. Gonderman, **J. K. Tripathi**, T. J. Novakowski, T. Sizyuk, and A. Hassanein
Journal of Nuclear Materials: 491, 199 **(2017) : Download**

24. Suppression of surface microstructure evolution in W and W-Ta alloys during simultaneous and sequential He and D ion irradiation in fusion relevant conditions
S. Gonderman, **J. K. Tripathi**, T. Sizyuk, and A. Hassanein
Nuclear Fusion: 57, 086001 **(2017) : Download**

25. Low energy helium ion irradiation induced nanostructure formation on tungsten surface.
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Tyler E Ray, *Jack C Johnson, **Jitendra K Tripathi**, Marius Wirtz, Jan W Coenen, Ahmed Hassanein
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*J.C. Johnson, T. Ray, **J.K. Tripathi**, and A. Hassanein
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T. Ray, *J.C. Johnson, **J.K. Tripathi**, and A. Hassanein
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67. Simulating tokamak PFC performance using simultaneous dual beam particle loading with pulsed heat loading
G. Sinclair, S. Gonderman, **J. K. Tripathi**, T. Ray, and A. Hassanein
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*A. Sundaram, **J. K. Tripathi**, T. J. Novakowski, and A. Hassanein
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*A. Q. Damico, **J. K. Tripathi**, T. J. Novakowski, G. Miloshevsky, and A. Hassanein
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*C. Ji, **J. K. Tripathi**, T. J. Novakowski, V. Sizyuk, and A. Hassanein
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***J. J. Fiala, **J. K. Tripathi**, S. Gonderman, and A. Hassanein
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***G. Joseph, **J. K. Tripathi**, S. S. Harilal, and A. Hassanein
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***K. Grundy, ***N. Watkins, A. Al-Ajlony, T. J. Novakowski, **J. K. Tripathi**, S. S. Harilal and A. Hassanein
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***N. Watkins, ***K. Grundy, A. Al-Ajlony, T. J. Novakowski, **J. K. Tripathi**, S. S. Harilal and A. Hassanein
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***Z. Pu, M. Catalfano**, **J. K. Tripathi**, S. S. Harilal, and A. Hassanein
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T. Perarasan, Mani Bharathi Manickavasagam, Priyanka Babu, Dileep Kumar, Mukul Gupta, Pooja Gupta, K. Ganesan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
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Chang Xia, Tyler Ray, **Jitendra Tripathi**, Jialong Huang, Yinghang Liu, Changxin Han, Amirr Neal, Chang Liu, Shiyu Zhou, Jack Conner Johnson, Claire Mihalko, Zhongyujie Liu, Xinghang Zhang, Ahmed Hassanein, and Haiyan Wang
Applied Surface Science (***to be submitted***)

(3) Conference/workshop/symposia participation (talk and/or poster) **56**
Student mentee/advisees are underscored; * undergraduates

1. Role of interfacial high-anisotropy pinning on creation and annihilation of skyrmion in Co/IrMn bilayer
T. Perarasan, Harish Nanda Arunachalam, Mani Bharathi Manickavasagam, Priyanka Babu, S. Chandramohan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
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2. Evolution of interfacial electronic structure and magnetic properties in annealed Ta|CoFeB|MgO|Ta multilayers
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6. Self-organized MoS_2 Nanocone Evolutions on Monolayer MoS_2 using Low Energy Ion Irradiation
Harish nanda Arunachalam, T. Perarasan, S. Durairaj, J. Sinha, E. Senthil Kumar, S. Chandarmohan, **J. K. Tripathi**
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7. Current-induced magnetization switching in ultrathin IrMn /CoFeB bilayer structures
T. Perarasan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
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8. Micromagnetic Study of Exchange Bias in Co_2MnSi/IrMn-Based Heterostructures
T. Perarasan, Harish Nanda Arunachalam, S. Chandramohan, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
International Conference on Advanced Functional Materials and Devices – 2024, SRM institute of Science and Technology, Kattankulathur, Tamilnadu, India, Feb. 26 - 29, **2024**

9. Performance of Tungsten-Tantalum alloys under dual ion beam irradiation and transient heat loading environments
T. Ray, **J.K. Tripathi**, and A. Hassanein
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10. Micromagnetic Simulation Study of Exchange Bias in FM/AFM Bilayer
T. Perarasan, B. Priyanka, P. Praveen, Harish Nanda Arunachalam, **Jitendra Kumar Tripathi**, Jaivardhan Sinha
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11. Effect of Low energy Ion Irradiation on Monolayer Molybdenum Disulfide (MoS_2) Layers
H. N. Arunachalam, T. Perarasan, S. Durairaj, S. Chandarmohan, G. Karuppiah, S. Amirthapandian, J. Sinha, and **J. K. Tripathi**
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12. Tailoring Si Nanocone Arrays via Simultaneous Low Energy Helium Ion Sputtering on Metal and Si Surfaces
N. Termini, **J. K. Tripathi**, and A. Hassanein
25th Conference on the Application of Accelerators in Research and Industry (CAARI-2018); Grapevine, Texas, USA; August 12-17, **2018**

13. Tuning MoO_3 nanostructures using low energy high flux He^+ ion irradiation.
J. K. Tripathi, T. J. Novakowski, *A. Sundaram, *A. Q. Damico, and A. Hassanein
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14. Effect of D^+ ion irradiation on Ta under fusion-relevant conditions
T. J. Novakowski, **J. K. Tripathi**, and A. Hassanein
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15. Tuning porosity of V_2O_5 by low energy He^+ ion irradiation
J. K. Tripathi, and A. Hassanein
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16. Emission dynamics of tungsten fuzz in response to ELM-like heat loading
G. Sinclair, **J. K. Tripathi**, P. K. Diwakar, *E. J. Wallace, and A. Hassanein
16th International Conference on Plasma-Facing Materials and Components for Fusion Applications (PFMC-16); Neuss near Düsseldorf, Germany; May 16 -19, **2017**

17. Temperature- and Fluence- Dependent Surface Morphology Evolution of Ta under High Flux, Low Energy He^+ Ion Irradiation
T. J. Novakowski, **J. K. Tripathi**, and A. Hassanein
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18. Performance of plasma facing component materials under high flux low energy helium ion irradiation, in extreme conditions: alternative material to tungsten for nuclear fusion applications.
J. K. Tripathi, and A. Hassanein
Homi Bhabha National Institute, Materials Physics Division, Indira Gandhi Centre for Atomic Research, Kalpakkam, India: November 9, **2016**

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20. Tuning Si nanostructures by low-energy high flux He^+ ion irradiation
T. J. Novakowski, **J. K. Tripathi**, and A. Hassanein
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21. Effect of Dual Ion Beam Irradiation (Helium and Deuterium) on Tungsten-Tantalum Alloys under Fusion Relevant Conditions
S. Gonderman, **J. K. Tripathi**, T. J. Novakowski, and A. Hassanein
22nd International Conference on Plasma Surface Interactions in Controlled Fusion Devices (22nd PSI); Rome, Italy; May 30- *June* 3**, 2016**

22. Thermal and Structural Evolutions of Tungsten Surface Exposed to Low-Energy Helium Ion Irradiation, by Transient Heat Loading
G. Sinclair, **J. K. Tripathi**, P. K. Diwakar, J. Linke and A. Hassanein
22nd International Conference on Plasma Surface Interactions in Controlled Fusion Devices (22nd PSI); Rome, Italy; May 30- *June* 3**, 2016**

23. Tailoring Molybdenum Fiber-Form Nanostructures (Mo-Fuzz) Using Carbon Impurity under Helium Ion Irradiation in Extreme Conditions

*N. A. Bharadwaj, **J. K. Tripathi**, S. Gonderman, and A. Hassanein
Undergraduate Research & Poster Symposium; Purdue Memorial Union North & South Ballrooms, Purdue University, USA; April 12, **2016**

24. Retention Properties of Tungsten after Simultaneous Ion Beam and Pulsed Laser Irradiation
S. Gonderman, **J. K. Tripathi**, T J. Novakowski, and A. Hassanein
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S. Gonderman, **J. K. Tripathi**, T. J. Novakowski, and A. Hassanein
17th International Conference on Fusion Reactor Materials (ICFRM); Eurogress Aachen, Germany; Oct. 11- 16, **2015**

26. Fluence-Dependent Surface Modification of Niobium by Low Energy He^+ Ion Irradiation at Elevated Temperatures
T. J. Novakowski, **J. K. Tripathi**, S. Gonderman, and A. Hassanein
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28. ELMs-like Transient Heat Load Induced Recrystallization and Grain Growth in Molybdenum
G. Sinclair, **J. K. Tripathi**, P. K. Diwakar, and A. Hassanein
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29. Structural Response of Hafnium to Low Energy Helium Ion Irradiation in Extreme Conditions for Future Fusion Devices
S. Gonderman, **J. K. Tripathi**, T. J. Novakowski, and A. Hassanein
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G. Sinclair, **J. K. Tripathi**, P. K. Diwakar, and A. Hassanein
15th international conference on **P**lasma – **F**acing Materials and Components (**PFMC**) for Fusion Applications; Aix-en-Provence, France; May 18-22, **2015.**

32. Effect of Low Energy He^+ Ion Irradiation on Surface Morphology, Mechanical Properties, and Fracture Behaviour of Molybdenum
J. K. Tripathi, H. Aglan, and A. Hassanein
PIRE student workshop at CMUXE; School of Nuclear Engineering, Purdue University, USA; May 11-12, **2015**

33. Effect of He^+ Ion Irradiation on Zirconium Microstructures Under Extreme Conditions
*E. Acosta, **J. K. Tripathi,** and A. Hassanein
2015 Undergraduate Research and Poster Symposium; Purdue University, USA; April 14, **2015**

34. Low Energy Ar^+ Ion Irradiation Induced Surface Modification in Cadmium Zinc Telluride (CdZnTe)
J. K. Tripathi, S. S. Harilal and A. Hassanein
23rd Conference on the Application of Accelerators in Research and Industry (CAARI-2014); Grand Hyatt Hotel Riverwalk in San Antonio, Texas, USA; May 25-30, **2014**

35. HRTEM study of self-assembled superparamagnetic iron-silicide nanoislands
M. Garbrecht, **J. K. Tripathi**, W. D. Kaplan, G. Markovich, and I. Goldfarb
15th European Microscopy Congress Manchester Central, UK; Sept. 16 – 21, **2012**

36. Superparamagnetism in self-ordered Iron-Silicide nanostructures on vicinal Si (111) surface
J. K. Tripathi, M. Garbrecht, W. D. Kaplan, G. Markovich and I. Goldfarb
15th Israel Matereials Engineering Conference (IMEC-15); Le Meridien hotel at the Dead Sea, Israel; Feb. 28 - March 1, **2012**

37. Coverage-depndent self-organized ordering in Metal Silicides
J. K. Tripathi, M. Garbrecht, Claudia G. Sztrum-Vartash, E. Rabani, W. D. Kaplan and I. Goldfarb
International Conference on Multifunctional Material-2010 (ICMM-2010); Department of Physics, Banaras Hindu University, Varanasi, India; Dec. 6-9, **2010**

38. Quantitative HRTEM Study of Self-Assembled Metal-Silicide Nanoislands
M. Garbrecht, **J. K. Tripathi**, I. Goldfarb, and W. D. Kaplan
International **M**icroscopy **C**ongress (IMC17); Rio de Janeiro, Brazil; Sept. 19-24, **2010**

39. Quantitative HRTEM Study of the Structure and Interface of Self-Assembled Metal-Silicide Nanoislands
M. Garbrecht, **J. K. Tripathi**, I. Goldfarb, and W. D. Kaplan
45th Annual Scientific Meeting of Israel Society of Microscopy (ISM); Kibbutz Hagoshrim, Israel; May 25-26, **2011**

40. Analytical High-Resolution Transmission Electron Microscopy of Self-Assembled Metal-Silicide Nanoislands
M. Garbrecht, **J. K. Tripathi**, I. Goldfarb, and W. D. Kaplan
44th Annual Scientific Meeting of ISM (Israel Society for Microscopy); Tel-Aviv University, Ramat Aviv, Israel; May 31, **2010**

41. Electronic growth of silicide heterostructures
**J. K. Tripathi, ***S. Manor, E. Roizin, M. Levinshtein and I. Goldfarb
14th Israel Materials Engineering Conference (IMEC-14); Tel Aviv University, Ramat Aviv, Israel; Dec. 13-14, **2009**

42. Self-Organization and Magic-heights of $CoSi_2$ and $TiSi_2$ Nanoislands on Si (111) substrates
*****S. Manor, **J. K. Tripathi**, M. Levinshtein, and I. Goldfarb
14th Israel Materials Engineering Conference (IMEC-14); Tel Aviv University, Israel; Dec. 13-14, **2009**

43. Modifications in structural and optical properties of Mn-ion implanted CdS thin films
S. Chandramohan, A. Kanjilal, *****T. Strache, **J. K. Tripathi**, S.N. Sarangi, R. Sathyamoorthy, and T. Som
2nd International Conference on Physics at Surfaces and Interfaces (PSI2009); Puri, India; Feb. 23 – 27, **2009**

44. Ion induced modification in structural and magnetic properties of Pt/Cr/Co multilayers.
J. K. Tripathi, A. Gupta, and T. Som
Homi Bhabha Centenary DAE-BRNS National Conference & HRI School on 'Spintronic and Magnetoelectronic Materials and Devices, Puri, India, January 8-10, **2009**

45. Mn^+ implanted CdS films: Correlation between structural and optical properties
S. Chandramohan, A. Kanjilal, **J. K. Tripathi**, S.N. Sarangi, R. Sathyamoorthy, T. Som
Second International Conference on Frontiers in Nanoscience and Technology, (Cochin Nano-2009); Cochin, India; January 3-6, **2009**

46. Tailoring magnetic properties by ion irradiation
J. K. Tripathi, A. Gupta and T. Som
Dept. Cond. Matter and Mater. Science, Tata Institute of Fundamental Research (TIFR); Mumbai, India; November 7-9, **2008.**

47. Tailoring magnetic properties of ultrathin Pt/Cr/Co multilayers by MeV ion irradiation
J. K. Tripathi, A. Gupta and T. Som
International conference and Humboldt-kolleg on structural characterization of materials relevant to nanotechnology, biomedical and Geobiology; Banaras Hindu University, Varanasi, India; Nov. 7-9, **2008 (Invited)**

48. Swift heavy ion beam induced mixing and chemical modifications at the metal/polymer interface
J. Prakash, A. Tripathi, S. A. Khan, S. Kumar, F. Singh, J. Tripathi, D. Kabiraj, **J. K. Tripathi**, and D. K. Avasthi
8th International Symposium on Ionizing Radiation and Polymers; Angra dos Reis/Rio de Janeiro, Brazil; Oct. 12 - 17, 2008

49. Modification of the magnetic and the structural properties of Pt/Cr/Co multilayers by He^+ ion irradiation
J. K. Tripathi, A. Kanjilal, P. Rajput, A. Gupta, and T. Som

16th International Conference on Ion Beam Modification of Materials (IBMM); Dresden, Germany; August 31 – Sept. 05, **2008**

50. MeV ion irradiation of Pt/Cr/Co multilayers: Correlation of structural and magnetic properties
J. K. Tripathi, A. Gupta and T. Som
Seminar-cum- Workshop on Materials Characterization & surface modification in research and Industry using Ion Accelerators (MCIA); Institute of Physics, Bhubaneswar, India; April 3**, 2008.**

51. Tuning magnetic property of Pt/Cr/Co multilayer by Ion irradiation
J. K. Tripathi, A. Gupta and T. Som
Institute of Physics, Bhubaneswar, India; January 07, **2008**

52. Phase formation and changes in magnetic property of Co/Cr/Pt multilayers
J. K. Tripathi, A. Gupta, and T. Som
15th International Conference on Surface Modification of Materials by Ion Beams (SMMIB-15); Mumbai, India, Sept. 30 – Oct. 05, **2007**.

53. Effect of ion beam irradiation on magnetic and structural properties of Pt/Cr/Co multilayers
J. K. Tripathi, D. Kumar, P. Malar, T. Osipowicz, V. Ganesan, A. Gupta, T. Som
18th International Conference on Ion Beam Analysis; Hyderabad, India; September 23-28, **2007**

54. A Study on Cr doped GaN DMS system
J. K. Tripathi, D. Kanjilal and T. Som
Workshop on Materials Science and Atomic/Molecular Physics Experiments using the Low Energy Ion Beam Facility; Inter-University Accelerator Centre, New Delhi, India; February 21, **2007**

55. Spintronic Behaviour in Swift Heavy Ion Irradiated Fe/Si devices.
J. K. Tripathi, and P. C. Srivastava
Workshop on Functional Oxide Materials, Inter-University Accelerator Centre; New Delhi, India; Sept. 25, **2006**

56. Nanomagnetism in Swift Heavy Ion Irradiated Ferromagnetic Metal/ Silicon interface.
J. K. Tripathi, P.C. Srivastava
Indo-German workshop on Synthesis and Modification of Nano-structured materials by Energetic Ion-Beams; New Delhi, India, February 20-24, **2005**

TALK DELIVERED: 29 (7 INVITED and 1 Gold Medal HONOR)

1. Ion Beam Engineering of Functional Materials: From Plasma-Facing Materials for Fusion Energy to Spintronics and 2D Materials
Jitendra Kumar Tripathi
Nuclear Physics Institute of the Czech Academy of Sciences, Rez 292, 250 68 Husinec, Czech Republic

2. Plasma Facing Component Materials under extreme conditions for Nuclear Fusion Applications
Jitendra Kumar Tripathi, Ahmed Hassanein
Purdue Fusion Energy Summer Camp for Minorities, Purdue University, July 31- Aug 4, **2023**

3. Performance of Plasma Facing Component Materials under Nearly Ideal Nuclear Fusion Environment: Alternate Materials to Tungsten for Harnessing the Power of the Sun on Earth
J. K. Tripathi, T. J. Novakowski, S. Gonderman, T. S. Sizyuk, A. Hassanein
International e-Symposium on Plasma for Energy (ISPE) - in association with The Open University UK, The Royal Society UK, RSC local section South India, Asian African Association for Plasma Training, and Solar Energy Society of India; SRM Institute of Science & Technology, Kattankulathu, Tamil Nadu India, 5-6 December 5-6, **2022** (online). **(INVITED)**

4. Mesoscopically Self-ordered Transition Metal Silicide Nanostructures: Electronic Growth and Magnetic Properties for Spintronics Applications
Jitendra Kumar Tripathi, Ilan Goldfarb

E Faculty development Program on Nanotechnology: Present advancement and Future Properties, AMITY Institute of Nanotechnology, AUUP, Noida, India January 18- 22, **2022**. **(INVITED)**

5. Tuning Mesoscopically Self-ordered Transition Metal Silicide Nanoisland Arrays for Spintronics Applications
Jitendra Kumar Tripathi, Ilan Goldfarb
Research Colloquium, organized by the Department of Physics and Nanotechnology Department of Physics and Nanotechnology, SRM Institute of Science & Technology, Kattankulathu, Tamil Nadu India. for October 06, **2022 (INVITED)**

6. Performance of Plasma Facing Component Materials under extreme conditions: Alternative Materials to Tungsten for Fusion Technology on Earth **(Honored by Gold Medal)**
J. K. Tripathi,
Research Day, SRM Institute of Science & Technology, Kattankulathu, Tamil Nadu India, March 1, 2021

7. Tuning MoO_3 nanostructures using low energy high flux He^+ ion irradiation.
J. K. Tripathi, T. J. Novakowski, A. Sundaram, A. Q. Damico, and A. Hassanein
Materials Science & Technology 2017 (MS&T 17), Pittsburgh, Pennsylvania, USA; Oct. 08 -12, **2017**

8. Experimental capabilities for advanced materials characterization at CMUXE, Purdue University
J. K. Tripathi, and A. Hassanein
Annual Nuclear Science User Facilities (NSUF) users meeting, Idaho Falls, ID, USA; May 23 - 25, **2017 (INVITED)**

9. Performance of plasma facing component materials under high flux low energy helium ion irradiation, in extreme conditions: alternative material to tungsten for nuclear fusion applications.
J. K. Tripathi, and A. Hassanein
Homi Bhabha National Institute, Materials Physics Division, Indira Gandhi Centre for Atomic Research, Kalpakkam, India: November 9, **2016**

10. An overview and capabilities for advanced materials characterization at CMUXE, Purdue University
J. K. Tripathi, and A. Hassanein
Annual Nuclear Science User Facilities (NSUF) users meeting, Idaho Falls, ID, USA; March 22-24, **2016 (INVITED)**

11. Tuning porosity of V_2O_5 by low energy He^+ ion irradiation
J. K. Tripathi, and A. Hassanein
Materials Science & Technology 2015 (MS&T 15), Greater Columbus Convention Center Columbus, OH, USA; Oct. 4-8, **2015**

12. Engineering novel materials in extreme conditions for clean energy production
J. K. Tripathi
CMUXE, School of Nuclear Engineering, Purdue University, USA; August 31, **2015**

13. Surface Science Nanostructure Group (SUSNAG) experimental capabilities at CMUXE, Purdue University
J. K. Tripathi
CMUXE, School of Nuclear Engineering, Purdue University, USA; May 27, **2015**

14. Surface Science Nanostructure Group (SUSNAG) at CMUXE: an overview
J. K. Tripathi
PIRE student workshop at CMUXE, School of Nuclear Engineering, Purdue University, USA, May 11-12, **2015**

15. Low energy He^+ ion irradiation induced surface modifications in molybdenum in extreme conditions: an alternative material for Tungsten in nuclear fusion applications.
J. K. Tripathi
CMUXE, School of Nuclear Engineering, Purdue University, USA; May 13, **2015**

16. Low energy He^+ ion irradiation induced surface modifications on W, Mo, and Ta in extreme conditions.
J. K. Tripathi
CMUXE, School of Nuclear Engineering, Purdue University, USA; October 01, **2014**

17. Low Energy Ar^+ Ion Irradiation Induced Surface Modification in Cadmium Zinc Telluride (CdZnTe)
J. K. Tripathi, S. S. Harilal and A. Hassanein

23rd Conference on the Application of Accelerators in Research and Industry (CAARI-2014), Grand Hyatt Hotel Riverwalk in San Antonio, Texas, USA; May 25-30 **(2014)**

18. Self-organized ordering in Metal Silicides on Si (111)
J. K. Tripathi
CMUXE, School of Nuclear Engineering, Purdue University, USA; May 15, **2013**

19. Superparamagnetism in self-ordered Iron-Silicide nanostructures on vicinal Si (111) surface
J. K. Tripathi, M. Garbrecht, W. D. Kaplan, G. Markovich and I. Goldfarb
15th Israel Matereials Engineering Conference (IMEC-15), Le Meridien hotel at the Dead Sea, Israel; February 28-March 1, **2012**

20. Coverage-depndent self-organized ordering in Metal Silicides
J. K. Tripathi, M. Garbrecht, C. G. Sztrum-Vartash, E. Rabani, W. D. Kaplan and I. Goldfarb
International Conference on Multifunctional Material-2010 (ICMM-2010), Department of Physics, Banaras Hindu University, Varanasi, India; December 6-9, **2010**

21. Electronic growth of silicide heterostructures
**J. K. Tripathi, ***S. Manor, *****E. Roizin, M. Levinshtein and I. Goldfarb
14th Israel Materials Engineering Conference (IMEC-14), Tel Aviv University, Israel; Dec.13-14, **2009**

22. Tailoring magnetic properties of ultrathin Pt/Cr/Co multilayers by MeV ion irradiation
J. K. Tripathi, A. Gupta and T. Som
International conference & Humboldt-kolleg on structural characterization of materials relevant to nanotechnology, biomedical & Geobiology, Banaras Hindu University, Varanasi, India; Nov. 7-9, **2008 (INVITED)**

23. Tailoring magnetic properties by ion irradiation
J. K. Tripathi, A. Gupta and T. Som
Dept. Cond. Matter and Mater. Science, Tata Institute of Fundamental Research (TIFR), Mumbai, India; November 7-9, **2008.**

24. MeV ion irradiation of Pt/Cr/Co multilayers: Correlation of structural and magnetic properties
J. K. Tripathi, A. Gupta and T. Som
Seminar-cum-Workshop on Materials Characterization & surface modification in research & Industry using Ion Accelerators (MCIA), Institute of Physics, Bhubaneswar, India; April 03**, 2008 (INVITED)**

25. Tuning magnetic property of Pt/Cr/Co multilayer by Ion irradiation
J. K. Tripathi, A. Gupta and T. Som
Institute of Physics, Bhubaneswar, India; January 07, **2008**

26. A Study on Cr doped GaN DMS system
J. K. Tripathi, D. Kanjilal and T. Som
Workshop on Materials Science and Atomic/Molecular Physics Experiments using the Low Energy Ion Beam Facility, Inter-University Accelerator Centre, New Delhi, India; February 21, **2007**

27. Spintronic Behaviour in Swift Heavy Ion Irradiated Fe/Si devices.
J. K. Tripathi, and P. C. Srivastava
Workshop on Functional Oxide Materials, Inter-University Accelerator Centre, New Delhi, India; September 25, **2006**

28. A Study on Magnetic Metal/Silicon Interface Devices; with and without Swift Heavy Ion Irradiation
J. K. Tripathi and P. C. Srivastava
Department of Physics, Banaras Hindu University, India; February 28, **2006**

29. Nano Granular Magnetic silicide phase formation due to Swift Heavy ion irradiation in Fe/Si structures
J. K. Tripathi and P. C. Srivastava
Inter-University Accelerator Centre, New Delhi, India; June 05, **2003**

Faculty Development Certificate Programs (Participation)

- 6 Days Faculty Development Program (FDP) on Enhanced Teaching, Learning, and Research in Applied Physics, Department of Physics and Nanotechnology, SRM Institute of Science & Technology, Kattankulathur, Tamil Nadu, India, November 17- 22, **2022**
- Online Professional Development Program (PDPOM:25) on "MATLAB and LabVIEW for Engineering Applications" NITTTR Chennai, India, June 20 -24, **2022**.
- Workshop on Virtual Reality Development Using Python, SRM Institute of Science & Technology, Kattankulathur, Tamil Nadu, India, June 18 -24 **2022.**
- E Faculty development Program on Nanotechnology: Present advancement and Future Properties, AMITY Institute of Nanotechnology, AUUP, Noida, India, January 18- 22, **2022.**
- AICTE Training and Learning (ATAL) Academy FDP: Nanotechnology Novel Materials and their Applications, July 19 – 23, **2021.**
- AICTE Training and Learning (ATAL) Academy FDP: Nanotechnology for Electronic and Photonic Devices (NanoDev-2021), July 12-16, **2021.**
- Workshop on 'Examination Reforms, SRM Institute of Science & Technology, Kattankulathur, Tamil Nadu, India, October 11 -20, **2021.**
- Workshop on Bloom's Taxonomy, Department of Physics and Nanotechnology, SRM Institute of Science & Technology, Kattankulathur, Tamil Nadu, India, August 02, **2021**

STUDENTS MENTORED/SUPERVISED:

I have been actively leading and mentoring students in surface science, nanostructures, and laser-material interactions, fostering academic and research excellence since 2013. At CMUXE, Purdue, I lead the Surface Science & Nanostructure (SUSNAG) and Laser Material Interaction (LMIG) groups, mentoring over 40 students across various levels (Ph.D.: 9, MS: 7, SURF: 8, UG: 23). Many of my mentees have received prestigious awards for best posters, presentations, and abstracts and have secured internships at national laboratories such as ANL, BNL, ORNL, and PNNL. Several undergraduate students have transitioned into scientific roles at CYMER (now part of ASML) and Onyx Aerospace, while others have pursued graduate studies at top institutions. Notably, five undergraduate students continued their MS and later pursued Ph.D. research at CMUXE, with three successfully completing their doctorates and securing scientist positions at CYMER (ASML) and General Atomics (GA). Prior to Purdue, I served as an Assistant Professor (2020–2023) at SRM Institute of Science & Technology, India, where I supervised two Ph.D. students and taught undergraduate and graduate courses. Following my move to Purdue in 2023, these students continued their research under a colleague in the same department and specialization. My commitment to student mentorship, research training, and academic leadership continues to shape the next generation of scientists and engineers in surface science, nanotechnology, and fusion materials. A brief detail of the students is as below:

GRADUATE

1. **Tyler Ray** (*Ph.D. NE, Purdue University → Postdoc,* PNNL) **2023 -25**
2. **H. Arunachalam** (*Ph.D. SRM Institute of Science & Technology, Kattankulathur, India Now associated to another colleague in the same department after my move to Purdue University*) **2021-23**
3. **T. Perarasan** (*Ph.D. SRM Institute of Science & Technology, Kattankulathur, India, now associated to another colleague in the same department after my move to Purdue University*) **2022 - 23**
4. **Nicholas Termini** (*Ph.D. Nuclear Engineering, Purdue University → DOE NNSA Laboratory Residency Graduate Fellowship (LRGF), now at ORNL*) **2017-19**

5. **Sean Gonderman** (*Nuclear Engineering, Purdue University → Research Scientist, General Atomics*) **2014-18**
6. **Gregory Sinclair** (*Nuclear Engineering, Purdue University → Scientist IV, General Atomics*) **2014 -18**
7. **Theodore Novakowski** (*Nuclear Engineering, Purdue Univ. → Architect (EUV Source) ASML*) **2013-17**
8. **Zhou Pu** (*Nuclear Engineering, Purdue University*) **2013**
9. **Manish Srivastava** (*Banaras Hindu University, India*) **2005 - 06**

UNDERGRADUATE & OTHER STUDENTS

10. **Halloran Matthew** (*Nuclear Engineering, Purdue University*) **2024**
11. **Chen Po-Yu** (*Physics, Purdue University*) **2024**
12. **Saketh Gopu** (*Aeronautics & Astronautics Engineering, Purdue Univ.*) **2024**
13. **Jack C Johnson** *(Nuclear Engineering, Purdue University)* **2023**
14. **Samera Hossain** (*Nuclear Engineering, Purdue University*) **2023-24**
15. **Arvind Sundaram** (*Nuclear Engin., Purdue Univ. → Senior Data Scientist, Covert Defenses*) **2017-19**
16. **Tyler Ray** (*Nuclear Engineering, Purdue University*) **2018**
17. **Alexander Couturier** (*Physics, Purdue Univ. → Physics, Emory Univ.)* **2016-18**
18. **Matthew Ryan Henn** (*Nuclear Engineering, Purdue University*) **2018-18**
19. **Nikhil Bharadwaj** (*Nuclear Engin., Purdue Univ. → System Integration Engin. ASML*) **2016-17**
20. **Antony Damico** (*Nuclear Engineering, Purdue University → Nuclear Fuels Engineer, Exelon Nuclear*) **2016-17**
21. **Eric Wallace** (*Nuclear Engineering, Purdue University*) **2016-16**
22. **Joseph Fiala** (*Aeronautics & Astronautics Engin., Purdue Univ. → Associate Engin. QuEST Global*) **2015-16**
23. **George Joseph** (*Nuclear Engineering, Purdue University → Manufacturing Engineer, Caterpillar Inc*) **2015-16**
24. **Eric Milan Acosta** (*Nuclear Engineering, Purdue University → University of Missouri-Columbia*) **2015-16**
25. **Trevor Kyle** (*Nuclear Engin., Purdue Univ. → Steering Systems Integration Engineer, General Motors*) **2015**
26. **Theodore Novakowski** (*Nuclear Engineering, Purdue University → Architect (EUV Source) ASML*) **2013-14**
27. **Mark Catalfano** (MS, *Nuclear Engineering, Purdue Univ.→ Research Scientist, Saxet Surface Science*) **2013-14**
28. **Kaitlin D Grundy** (*Nuclear Engin., Purdue Univ. → Graduate researcher North Carolina State Univ.*) **2013-14**
29. **Roizin Evgeny** (*MS, Mechanical Engineering, Tel Aviv Univ., Israel*) **2009-10**

30. **Shirley Manor** (*MS, Mechanical Engineering, Tel Aviv Univ. Israel*) **2009-10**
31. **Manish Jaiswal** (*MS Project, Banaras Hindu University, India*) **2005**
32. **Nishi Srivastava** (*MS Project, Banaras Hindu University, India*) **2004**
33. **Joyeeta Lahiri** (*MS Project, Banaras Hindu University, India*) **2003**
34. **Abhishek Srivastava** (*MS Project, Banaras Hindu University, India*) **2002**
35. **Kennth Butler** (*NSF-PIRE exchange student, Tuskegee University*) **2018**
36. **Jalen A. Rice** (*NSF-PIRE exchange student, Tuskegee University*) **2018**
37. **Terrence Glover** (*NSF-PIRE exchange student, Tuskegee University*) **2015**
38. **Norris Watkins II** *(NSF-PIRE exchange student, Tuskegee University)* **2015-16**
39. **Jonathan Rocha** (*NSF-PIRE exchange student, Tuskegee University*) **2013**
40. **Antony Damico** (*SURF student → Nuclear Fuels Engineer, Exelon Nuclear*) **2016**
41. **Ji Cheng** (*SURF student, Purdue University*) **2016**
42. **Nikhil Bharadwaj** (*SURF student → System Integration Engineer, ASML*) **2016**
43. **Joseph Fiala** (*SURF student, Purdue University → Associate Engineer QuEST Global*) **2015**
44. **George Joseph** (*SURF student, Purdue University → Manufacturing Engineer, Caterpillar Inc*) **2014**
45. **Arvind Sundaram** (*SURF student, Purdue University → Senior Data Scientist, Covert Defenses)* **2014**
46. **Kaitlin D Grundy** (*SURF student, Purdue Univ. → Graduate researcher North Carolina State Univ*.) **2013**
47. **Norris Watkins** II (*SURF student, Purdue University*) **2013**

COURSE OFFERINGS

- Nanoscale Materials: Synthesis and Characterization (20NTC502J) SRM-IST, KTR, INDIA
- Physics and Chemistry of Nanomaterials (20NTC503J) SRM-IST, KTR, INDIA
- Nanoscale Magnetic Materials and Device (20NTE502T) SRM-IST, KTR, INDIA
- Advanced data analysis & simulations for nanomaterial surface characterizations (value added course) SRM-IST, KTR, INDIA
- Advanced Characterization of Nanomaterials (18NTC107J) SRM-IST, KTR, INDIA
- Semiconductor Physics (18PYB103J) SRM-IST, KTR, INDIA
- Semiconductor Physics and Computation Methods (21PYB102J) SRM-IST, KTR, INDIA

COURSE CO-ORDINATOR

- Nanoscale Materials: Synthesis and Characterization (20NTC502J) SRM-IST, KTR, INDIA
- Physics and Chemistry of Nanomaterials (20NTC503J) SRM-IST, KTR, INDIA
- Nanoscale Magnetic Materials and Device (20NTE502T) SRM-IST, KTR, INDIA

• Advanced data analysis & simulations for nanomaterial surface characterizations (value added course) SRM-IST, KTR, INDIA

• Advanced Characterization of Nanomaterials (18NTC107J) SRM-IST, KTR, INDIA

• Semiconductor Physics and Computation Methods (21PYB102J) SRM-IST, KTR, INDIA

COURSE DESIGN and DEVELOPMENT

Designed and developed two courses for Integrated M.Tech. Program

- Magnetism and Magnetic Materials (21NTC305J) SRM-IST, KTR, INDIA
- Surface Engineering (21NTE325T) SRM-IST, KTR, INDIA

Orientation program Organized

Orientation program on SEMICONDUCTOR PHYSICS AND COMPUTATIONAL METHODS (21PYB102J) [*Zoom platform*] **August 12, 2022 SRM-IST, KTR, INDIA**

EXPERIMENTAL FACILITIES DESIGNED and DEVELOPED AT CMUXE-PURDUE

I designed and developed several unique UHV experimental facilities at CMUXE-Purdue. A brief description of the same (major) is listed below (more details on **personal webpage**)

- **In-situ Single Ion Beam Irradiation (SIBI) in extreme conditions:**

  Equipped with two low-energy, high-flux, broad-beam ion sources, positioned perpendicularly to tailor nanostructure size, shape, and arrays. The system features X, Y, Z & in-plane sample rotation, cooling & heating (LN_2–1473 K), steady-state temperature control, K-type thermocouples, and a high-sensitivity pyrometer, providing unparalleled precision in ion-induced modifications.

- **In-situ Dual Ion Beam Irradiation (DIBI) in extreme conditions:**

  Features dual low-energy ion sources oriented 90° apart (45° from sample normal), converging on the supercenter of the UHV chamber. Advanced temperature control (LN_2 – 1500 K) and high-resolution in-situ diagnostics enable real-time analysis of irradiation effects.

- **Unique UHV Facility for Simultaneous Dual Beam Ion Irradiation (DIBI),** Transient Heat (0.4 -1.5 GW m^{-2}), and Steady-State Heat (≤ 4 MJ m^{-2}). This one-of-a-kind system replicates nearly ideal nuclear fusion conditions at the laboratory scale, simultaneously applying:

  1. Low-energy, high-flux dual ion (D^+ + He^+) beams
  2. Transient heat via high-power pulsed millisecond laser (ELM-mode simulation)
  3. Steady-state heating (≤1473 K)
     Designed for erosion and mitigation studies, this system integrates a high-resolution quartz crystal microbalance (QCM) and witness plate techniques for in-situ analysis.

- **Thermal Desorption Spectroscopy:**

  An UA UHV-based system for analyzing desorbed gas species using a residual gas analyzer (RGA) with high mass resolution (~0.5 amu, up to 100 amu detection). The specialized resistive and e-beam heater achieves temperatures up to 1100 K, with precise PID-controlled ramping (2.5 K/s).

- **RF sputter and ion beam assisted deposition (IBAD):**

Featuring two sputtering guns at 45º and an additional Mantis sputter ion gun (aligned with normal substrate), allowing simultaneous substrate sputtering. The unique design ensures precise ion-assisted thin film growth and interface engineering.

- **Pulsed Laser Deposition (PLD):**

  A high-precision PLD system for ultrathin film and multilayer growth, utilizing a Q-Smart 450 ns laser (1064 nm, 532 nm, 355 nm) with 10 Hz, 5 ns pulse width. The system includes a 2-inch rotating target stage, a fully programmable substrate heater (≤1223 K, O_2-compatible up to 1 atm), and a movable XYZ manipulator for precise alignment. LEED and RHEED capabilities will be integrated for real-time surface characterization.

- **Optical Reflectivity measurement:**

  This system employs broadband incident light (200 – 1100 nm, halogen & deuterium sources) with a Maya 2000 Pro Spectrometer. It enables specular and diffuse reflection measurements *via.* a high-precision optical probe, ensuring accurate optical property characterization.

ACADEMIC SERVICE, PEER REVIEW, AND SYNERGISTIC ACTIVITIES

Peer Reviewer

(1) Research Grant Reviews:

- *National Science Foundation (NSF)* (Ad hoc)
- *The Pazy Foundation* (Jointly established by the Israeli University Planning and Budgeting Committee (UPBC) and the Israeli Atomic Energy Commission (IAEC)) (Ad hoc)

(2) International Journal Peer Reviews: (***180+*** *articles, including 36+ high-impact international journals*)
(more details at Clarivate page)

- **American Physical Society (APS):** *Physical Review Letters, Physical Review B, Physical Review Applied, Physical Review Materials, Physical Review X*
- **American Institute of Physics (AIP):** *Journal of Physics, APL Materials*
- **Institute of Physics (IOP):** *Journal of Physics: Condensed Matter, Journal of Physics D: Applied Physics, Nanotechnology, Journal of Optics, Semiconductor Science and Technology, Surface Topography: Metrology & Properties, Physica Scripta, Japanese Journal of Physics, Materials Research Express, Nuclear Fusion, Superconductor Science and Technology*
- **Elsevier:** *Nuclear Instruments and Methods in Physics B, Journal of Magnetism and Magnetic Materials, Journal of Nuclear Materials, Surface and Coating Technology*
- **American Nuclear Society (ANS):** *Fusion Science and Technology*
- **Scientific & Technological Journals:** *Journal of Nuclear Energy Science & Power Generation Technology*
- **Springer:** *Applied Physics A*
- **MDPI:** *Materials, Metals, Electronics, Processes, Nanomaterials, Computation*
- **EDP Sciences:** *European Physical Journal: Applied Physics*

(3) International Research Books and Chapters: Springer Science and Taylor & Francis Group

- Contributor and Reviewer for *Springer Science* and *Taylor & Francis Group*

SYNERGISTIC ACTIVITIES

Committee Memberships & Leadership Roles

- **Technical Committee Member** – *6th International Conference on Nanoscience and Nanotechnology (ICONN 2021), SRM Institute of Science & Technology, India*
- **Certificate Committee Member** – *ICONN 2021, SRM Institute of Science & Technology, India*
- **Core Committee Member** – *DST-FIST Proposal 2021, SRM Institute of Science & Technology, India*
- **Head, Proposal Write-up Committee** – *SATHI Program – 2021, SRM Institute of Science & Technology, India*

Scientific Society Memberships

- **Full Active Member:**
  - *American Physical Society (APS)* (2016–Present)
  - *Sigma Xi, The Scientific Research Society* (2016–Present)

Conference Session Chair

- *Purdue University SURF Research Symposium:*
  - August 2, 2018
  - August 6, 2015

Judge for Research Competitions & Science Fairs

- **Graduate Student & Post-Doctoral Fellow Research Awards Competition** (*Purdue University Sigma Xi Chapter*)
  - February 20, 2019
  - February 21, 2018
  - February 14, 2017
  - March 2, 2016
- **Lafayette Regional Science and Engineering Fair, Purdue University**
  - March 8, 2019
  - March 2, 2018
  - March 3, 2017
  - March 4, 2016
- **Undergraduate Research and Poster Symposium, Purdue University**
  - April 12, 2016