# Shikhar Misra

*LTD Yield Engineer*
*Defect Metrology Group*
*Intel Corporation*

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## Education

2016-2020 **Purdue University, West Lafayette, Indiana, USA**.
Doctor of Philosophy (PhD) in *Materials Engineering* GPA: **3.87**/4
*Advisor*: Dr. Haiyan Wang
*Research Interests*: Thin Film Epitaxy, Nanocomposites, Metamaterials

2015-2016 **Indian Institute of Technology Kanpur, India**.
Masters of Technology (M. Tech) in *Materials Science and Engineering* GPA: **10**/10
*Advisor*: Dr. Krishanu Biswas

2011-2015 **Indian Institute of Technology Kanpur, India**.
Bachelors of Technology (B. Tech) in *Materials Science and Engineering* GPA: **8.2**/10

## Honors and Awards

2019 Won the **Best Poster** Award (top 1%) at the Materials Research Society (**MRS**) Fall Meeting and Exhibit, 2019

2019 Awarded the PGSG travel grant (top 10%) and the College of Engineering **travel grant**

2019-20 Recipient of the highly competitive **Bilsland Dissertation Fellowship** provided by the Graduate School given to one student from the MSE department at Purdue University

2016 Recipient of prestigious **IIT-Todai** graduate student scholarship 2016 among 10 students from India

2014, 2015 **Academic Excellence Award** recipient for the consecutive academic year 2013-14 and 2014-2015, awarded to top 5% students at IIT Kanpur

2011 Secured **All India Rank 2300** (Percentile:99.54) in IIT-JEE'11 and **All India Rank 937** in AIEEE'11

2011–16 Awarded **scholarship** 'Incentive scheme for meritorious children' by State Bank of India for being in good academic standing throughout the stay at IIT Kanpur

2010 $7^{th}$ **position** in Regional Mathematics Olympiad (RMO 2010) in the state of Uttar Pradesh

## Professional Experience

Oct'20–present **Intel Corporation**, *Hillsboro, Oregon, USA*.
*Title* : Technology Development (TD) Module and Integration Yield Engineer (Defect Metrology)

- Logic Technology Development (LTD) yield engineer in the defect metrology module developing 10, 7, and 5 nm process technologies
- Drove the development of the process for the unpatterned wafer inspection scan and review at the front end of the manufacturing process
- Close collaboration with cross functional teams of Process and Integration engineers to determine technology requirements
- Transfer of the technology to Intel's 300 mm factories in Arizona, Israel and Ireland
- Partnered with equipment suppliers to drive the development of the hardware and process
- Routinely applied SPC, JMP and statistical Data Analytics to monitor trends and find causes for signals to improve device yield

## Research Experience

Aug'16–Aug'20 **Metal-oxide nanocomposites for tunable physical properties**, *Graduate Research Assistant, Purdue University*.
Advisor : Prof. Haiyan Wang
*Objective*: Exploration of multiple metal-oxide thin film nanocomposite systems to study the light-matter interaction. The goal span both tuning the physical properties and understanding the growth mechanisms of complex nanocomposite systems towards the successful fabrication of nanocomposite-based devices.

Aug'15–May'16 **Bulk Preparation of Graphene: Synthesis and Applications**, *M.Tech Thesis, IIT Kanpur, India*.
Advisor : Prof. Krishanu Biswas
*Objective*: Fabricating graphene and graphene-silver nanoparticle hybrid cheaply on a large scale using a domestic kitchen blender for water purification applications

Summer'15 **Current injection in heterostructures based on 2D semiconductors**, *EPFL, Switzerland*.
Advisor : Prof. Andras Kis
*Objective*: To demonstrate spin injection from a ferromagnetic electrode into a heterojunction based on monolayers of $WSe_2$ and $MoS_2$

Summer'14 **Growth of CVD graphene with mixed $^{12}C$ and $^{13}C$ isotopes**, *University of Vienna, Austria*.
Advisor : Prof. Jannik Meyer
*Objective*: To decipher the CVD growth mechanism of benzene by synthesizing mixed graphene followed by analysis in STEM using EELS spectroscopy

Summer'13 **Refinement of austenite grain structure of Fe-0.45C Steel**, *Hokkaido University, Japan*.
Advisor : Prof. Munekazu Ohno
*Objective*: To refine inversely transformed austenite grain structure of Fe-0.45C Steel by Nb addition

## Technical Skills

Fabrication: Pulsed Laser Deposition (PLD), Chemical Vapor Deposition (CVD), Mechanical exfoliation

Characterization: Atomic Force Microscopy (AFM), Piezoresponse Force Microscopy (PFM), Transmission Electron Microscopy (TEM), X-Ray Diffraction (XRD), Raman Spectroscopy, UV-Vis Spectroscopy, Ellipsometry, Physical Property Measurement System (PPMS)

Computation: COMSOL Multiphysics, Tensorflow, Keras, ANSYS Fluent, JMP, AutoCAD, DesignCAD

Graphics & Design: Adobe Illustrator, Adobe Premiere Pro, Adobe After Effects, Adobe Photoshop, 3DS Max, Inkscape

## Journal Publications

**32 publications in peer-reviewed journals, including 2 invited reviews, >340 citations, h-index=10**

⋆ First Author

2020
1. **S. Misra**, D. Zhang, P. Lu, H. Wang *Thermal stability of self-assembled ordered three-phase $Au-BaTiO_3-ZnO$ nanocomposite thin films via in situ heating in TEM*, published in *Nanoscale,* (2020)
2. **S. Misra**, D. Zhang, Z. Qi, D. Li, J. Lu, H.-T. Chen, H. Wang *Morphology Control of Self-Assembled Three-Phase $Au-BaTiO_3$˘$ZnO$ Hybrid Metamaterial for Tunable Optical Properties*, published in *Crystal Growth and Design,*20, 6101-6108 (2020)
3. **S. Misra**, M. Kalaswad, D. Zhang, H. Wang, *Dynamic measurement of electrically tunable dielectric permittivity in $BaTiO_3$ using spectroscopic ellipsometer*, published in *Materials Research Letters,* 8, 321-327 (2020)

4. **S. Misra**, L. Li, X. Gao, J. Jian, Z. Qi, D. Zemlyanov, H. Wang L. Li, D. Zhang, J. Jian, Z. Qi, M. Fan, H.-T. Chen, X. Zhang, H. Wang, *Tunable Physical Properties in $Bi_2Al_{1-x}Mn_xO_6$ Thin Films with Novel Layered Supercell Structures*, published in *Nanoscale Advances,* 2, 315-322 (2020)

2019 5. **S. Misra**, L. Li, D. Zhang, J. Jian, Z. Qi, M. Fan, H.-T. Chen, X. Zhang, H. Wang, *Self-assembled ordered three-phase $Au - BaTiO_3 - ZnO$ vertically aligned nanocomposites achieved by a templating method*, published in *Advanced Materials,* 31(7), 1806529 (2019)

2018 6. **S. Misra**, L. Li, J. Jian, J. Huang, X. Wang, D. Zemlyanov, J. Jang, F.H. Ribeiro, H. Wang, *Tailorable Au nanoparticles embedded in epitaxial TiO2 thin films for efficient photocatalysis*, published in *ACS Applied Materials and Interfaces,* 10(6), 5779-5784 (2018)

### ⋆ Invited Review Articles

2021 7. O.J. Lee*, **S. Misra***, H. Wang, J.L. Mac-Manus Driscoll, *Ferroelectric/multiferroic self-assembled vertically aligned nanocomposites: Current and future status*, published in *APL Materials,* (2021)

8. **S. Misra**, H. Wang, *Review on the growth, properties and applications of self-assembled oxide–metal vertically aligned nanocomposite thin films—current and future perspectives*, published in *Materials Horizon,* (2021)

### ⋆ Co-Author

2021 9. R.L. Paldi, Z. Qi, **S. Misra**, J. Lu, X. Sun, X.L. Phuah, M. Kalaswad, J. Bischoff, D.W. Branch, A. Siddiqui, H. Wang *Nanocomposite-Seeded Epitaxial Growth of Single-Domain Lithium Niobate Thin Films for Surface Acoustic Wave Devices*, published in *Advanced Photonics Research,* (2021)

10. Z. Qi, R. Xu, **S. Misra**, H. Wang, J. Huang, K. Zhao, *Ellipsometry-based failure analysis on translucent $LiMn_{0.5}Ni_{0.3}Co_{0.2}O_2$ in half-cell thin-film lithium-ion battery on glass substrates*, published in *Materials Today Advances,* (2021)

11. D. Zhang, **S. Misra**, J. Jian, P. Lu, L. Li, A. Wissel, X. Zhang, H. Wang *Self-Assembled $BaTiO_3$ˇ$Au_xAg_{1ˇx}$ Low-Loss Hybrid Plasmonic Metamaterials with an Ordered "Nano-Domino-like" Microstructure*, published in *ACS Applied Materials and Interfaces,* (2021)

2020 12. D. Zhang, P. Lu, **S. Misra**, A. Wissel, Z. He, Z. Qi, X. Gao, X. Sun, J. Liu, J. Lu, X. Zhang, H. Wang, *Design of 3D Oxide–Metal Hybrid Metamaterial for Tailorable Light–Matter Interactions in Visible and Near-Infrared Region*, published in *Advanced Optical Materials,* (2020)

13. Z. He, J. Jian, **S. Misra**, X. Gao, X. Wang, Z. Qi, D. Zhang, H. Wang, *Bidirectional tuning of phase transition properties in $Pt : VO_2$ nanocomposite thin films*, published in *Nanoscale,* 12, 17886-17894 (2020)

14. J. Liu, X. Wang, X. Gao, H. Wang, J. Jian, J. Huang, X. Sun, Z. Qi, **S. Misra**, Z. He, H. Wang, *Multifunctional self-assembled $BaTiO_3 - Au$ nanocomposite thin films on flexible mica substrates with tunable optical properties*, published in *Applied Materials Today,* 21, 100856 (2020)

15. B. Zhang, M. Kalaswad, B. Rutherford, **S. Misra**, Z. He, H. Wang, Z. Qi, A. Wissel, X. Xu, H. Wang, *Au-Encapsulated Fe Nanorods in Oxide Matrix with Tunable Magneto-Optic Coupling Properties*, published in *ACS Applied Materials and Interfaces,* 12, 51827-51836 (2020)

16. B. Zhang, J. Huang, B. Rutherford, P. Lu, **S. Misra**, M. Kalaswad, X. Sun, L. Li, H. Wang, *Tunable, Room Temperature Multiferroic $Fe - BaTiO_3$ Vertically Aligned Nanocomposite with Perpendicular Magnetic Anisotropy*, published in *Materials Today Nano,* 100083 (2020)

17. Z. Qi, J. Tang, **S. Misra**, C. Fan, P. Lu, J. Jian, Z. He, V. G. Pol, X. Zhang, H. Wang, *Enhancing electrochemical performance of thin film lithium ion battery via introducing tilted metal nanopillars as effective current collectors*, published in *Nano Energy,* 69, 104381 (2020)

18. X.L. Phuah, H. Wang, Z. Qi, **S. Misra**, M. Kalaswad, H. Wang, *Flash sintering of Gd-doped ceria thin film*, published in *Journal of the American Ceramics Society,* 103, 2309-2314 (2020)

*equal contribution

2019 19. Y. Ji, Z. Qi, **S. Misra**, R. Jin, Y. Liu, X. Ou, Y. Lin, H. Yang, H. Wang, *Breaking lattice symmetry in highly strained epitaxial $VO_2$ films on faceted nanosurface*, published in *ACS Applied Materials and Interfaces,* 11, 44905-44912 (2019)

20. D. Zhang, **S. Misra**, L. Li, X. Wang, X. Gao, X. Sun, J. Jian, P. Lu, Z. Qi, M. Kalaswad, X. Zhang, H. Wang, *Optical Tuning of Self-Assembled $Au - BaTiO_3$ Vertically Aligned Nanocomposites via Geometry Control: from Nanopillar to Nanodisk*, published in *Advanced Optical Materials,* 1901359 (2019)

21. L. Li, J. Cheng, H. Wang, J. Huang, X. Gao, X. Wang, **S. Misra**, B. Zhang, J. Jian, A. Chen, P. Lu, X. Qian, K. Yang, H. Wang, *Interfacial Engineering Enabled Novel Bi-Based Layered Oxide Supercells with Modulated Microstructures and Tunable Physical Properties*, published in *Crystal Growth and Design,* 6, 100037 (2019)

22. B. Zhang, J. Huang, J. Jian, B. Rutherford, L. Li, **S. Misra**, X. Sun, H. Wang, *Tuning Magnetic Anisotropy in $Co - BaZrO_3$ Vertical Aligned Nanocomposites for Memory Device Integration*, published in *Nanoscale Advances.*1 (11), 4450-4458 (2019)

23. J. Jian, X. Wang, **S. Misra**, X. Sun, Z. Qi, X. Gao, J. Sun, A. Donohue, D. G. Lin, V. Pol, J. Youngblood, H. Wang, L. Li, J. Huang and H. Wang, *Broad range tuning of phase transition property in $VO_2$ through metal-ceramic nanocomposite design*, published in *Advanced Functional Materials,* 1903690 (2019)

24. L. Li, P. Boullay, J. Cheng, P. Lu , X. Wang, G. Steciuk, J. Huang, J. Jian, X. Gao, B. Zhang, **S. Misra**, X. Zhang, K. Yang, H. Wang, *Self-assembled two-dimensional layered oxide supercells with modulated layer stacking and tunable physical properties for flexible nanoscale electronics*, published in *Materials Today Nano,* 6, 100037 (2019)

25. J. Wu, B. Gautam, M.A. Sebastian, V. Ogunjimi, **S. Misra**, J. Huang, J. Baca, J. Prestigiacomo, T. Haugan, H. Wang, M. Osofsky, *Pinning Efficiency of one-dimensional artificial pinning centers in $YBa_2Cu_3O_{7-x}$ thin films*, published in *IEEE Transactions on Applied Superconductivity,* 29(5), 1-5 (2019)

26. M. Parekh, V. Parikh, P. Kim, **S. Misra**, Z. Qi, H. Wang, V. Pol, *Encapsulation and networking of silicon nanoparticles using amorphous carbon and graphite for high performance Li-ion batteries*, published in *Carbon,* 148, 36-43 (2019)

27. R. Xu, Y. Ji, R. Bouchilaoun, F. Qian, M. Li, X. Zhang, R. Tang, R. Zhao, **S. Misra**, H. Wang, W. Li, C. Kan, D. Shi, J. Fan, H. Yang, *Optical and electrical properties of (111)-oriented epitaxial $SrVO_3$ thin films*, published in *Ceramics International,* 45(9), 11304-11308 (2019)

2018 28. B. Gautam, M.A. Sebastian, S. Chen, **S. Misra**, J. Huang, F.J. Baca, R. Emergo, T. Haugan, Z. Xing, H. Wang, J.Z. Wu, *Probing the effect of interface on vortex pinning efficiency of one-dimensional $BaZrO_3$ and $BaHfO_3$ artificial pinning centers in $YBa_2Cu_3O_{7-x}$ thin films*, published in *Applied Physics Letters,* 113(21), 212602 (2018)

29. J. Huang, T. Jin, **S. Misra**, H. Wang, Z. Qi, Y. Dai, X. Sun, L. Li, J. Okkema, H.-T. Chen, P.-T. Lin, X. Zhang, H. Wang, *Tailorable optical response of $Au - LiNbO_3$ hybrid plasmonic metamaterial thin films for optical waveguide applications*, published in *Advanced Optical Materials,* 6(19), 1800510 (2018)

30. M. Fan, H. Wang, **S. Misra**, B. Zhang, Z. Qi, X. Sun, J. Huang, H. Wang, *Microstructure, magnetic and magnetoresistance properties of $La_{0.7}Sr_{0.3}MnO_3 : CuO$ nanocomposite thin films*, published in *ACS Applied Materials and Interfaces,* 10(6), 5779-5784 (2018)

2017 31. L. Li, P. Boullay, P. Lu, X. Wang, J. Jian, J. Huang, X. Gao, **S. Misra**, W. Zhang, O. Perez, G. Steciuk, A. Chen, X. Zhang, H. Wang, *Novel layered supercell structure from $Bi_2AlMnO_6$ for multifunctionalities*, published in *Nano Letters,* 17(11), 6575-6582 (2017)

2016 32. O.L. Sanchez, D. Ovchinnikov, **S. Misra**, A. Allain, A. Kis, *Valley polarization by spin injection in a light-emitting van der Waals heterojunction*, published in *Nano Letters,* 16(9), 5792-5797 (2016)

Google Scholar Profile Shikhar Misra

## Selected Conferences and Presentations

2020 6. **S. Misra**, L. Li, J. Jian, J. Huang, X. Wang, D. Zemlyanov, J. Jang, F. H. Ribeiro and H. Wang, *Self-assembled ordered three-phase Au-BaTiO3-ZnO vertically aligned nanocomposites achieved by a templating method*, oral presentation at *Electronic Materials and Applications (2020)*, Orlando, FL, USA

2019 5. **S. Misra**, L. Li, J. Jian, J. Huang, X. Wang, D. Zemlyanov, J. Jang, F. H. Ribeiro and H. Wang, *Self-assembled ordered three-phase Au-BaTiO3-ZnO vertically aligned nanocomposites achieved by a templating method*, won **best poster** at *MRS Fall Meeting and Exhibit (2019)*, Boston, MA, USA

4. **S. Misra**, L. Li, J. Jian, J. Huang, X. Wang, D. Zemlyanov, J. Jang, F. H. Ribeiro and H. Wang, *Tailorable Au nanoparticles embedded in epitaxial TiO2 thin films for efficient photocatalysis*, oral presentation at *Electronic Materials and Applications (2019)*, Orlando, FL, USA

2018 3. J. Wu, B. Gautam, M. A. Sebastian, **S. Misra**, J. Huang, S. Chen, J. Prestigiacomo, T. Haugan, H. Wang, M. Osofsky and Z. Xing, *Probing the effect of interface on pinning efficiency of 1D BaZrO3 and BaHfO3 artificial pinning centers in YBa2Cu3O7-x thin films*, at *Applied Superconductivity Conference (ASC)(2018)*, Seattle, WA, USA

2016 2. **S. Misra**, and K. Biswas, *Bulk preparation of graphene: Synthesis and Applications*, poster presentation at *International Conference on Metals and Materials Research (ICMR)(2016)* IISc Bangalore, Bangalore, KA, India .

2014 1. **S. Misra**, K. Mishra and N.P. Gurao, *Cryo-cross Rolling of SS304*, secured $3^{rd}$ position in poster presentation at *Metallix (2014)*, Jadavpur University, Kolkata, WB, India.

## Teaching Experience

Aug–Dec'18 **Teaching Assistant, MSE370**, *Electrical, Optical and Magnetic Properties of Materials*, Purdue University.

Jan–Apr'16 **Teaching Assistant, MSE314**, *Process Engineering Laboratory*, IIT Kanpur.

Jan–Apr'16 **NPTEL Teaching Assistant**, *Online course on Phase Diagrams in Materials Science and Engineering*.

Jul–Dec'15 **Teaching Assistant, MSE626A**, *Transport Phenomena*, IIT Kanpur.

Jan-Apr'14 **Academic mentor**, *Hall of Residence-3*, IIT Kanpur.

## Professional Affiliations

- Material Advantage, Student member
- Materials Research Society (MRS), Student member
- Indian Institute of Technology Kanpur (IITK) Alumni Association

## References

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