

Pawan Tyagi, Ph.D.

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Professional Preparation:

Academic training:

Johns Hopkins University	Chemical and Biomolecular Engineering	Postdoctoral scholar, (2008-2010)
University of Kentucky	Materials Sci.and Eng.	Ph.D. (2005-2008)
Indian Institute of Technology Kanpur (IITK)	Materials Sci.and Eng.	M.S. (2000-2002)
Industrial Training at MIDHANI, India	Metal & Alloys Manufacturing	Trainee (1998-1999)
Indian Institute of Technology Roorkee (IITR)	Materials Sci.and Eng.	B.S. (1994-1998)

Awards and Academic merits:

1. BEYA STEM Innovator Award 2020, BEYA Global Conference, 14, Feb 2020, Washington DC.
2. Federal Grants Awards: \$10 Million (as PI) and additional \$11 M as co-PI at UDC
3. 47 Peer reviewed publications, 530 citations, Research Gate score 26.47.
4. Four consecutive School of Engineering Awards 2012-2016 for Excellence in Research
5. Nine consecutive outstanding rating in 2012-2020 yearly faculty evaluation at UDC.
6. Summa cum laude (4 GPA) in graduate school at University of Kentucky (2002-2008)
7. 17th National rank (3rd South Zone rank) in Graduate Aptitude Test for Engineers (GATE), India.

Employment History:

October-2016-Present	Associate Professor	University of the District of Columbia
January 2012-September 2016	Assistant professor	University of the District of Columbia
August 2010 –December 2011	Visiting professor	University of the District of Columbia
June 2010 –Present	Adjunct professor	Johns Hopkins University
August 2002-April 2008	Graduate research assistant	University of Kentucky
July 2000-August 2002	Teaching assistant	Indian Institute of Technology
July 1998-July 2000	Quality control engineer	MIDHANI Alloy and Steel Plant
July 1997-June 1998	Research Assistant	Indian Institute of Technology

Research: Citations, quality, and impact:

Research papers are in ISI indexed journals and listed on Web of Science data base and Google Scholar.

530 citations in the Google Scholar. 900 downloads of graduate thesis work internationally.

26.47 RG Score: impact score for published research (Source www.researchgate.net).

This score is higher than 82.5% of worldwide 10 M membership of this research network.

Two patents pending

Won \$10 Million (as PI) and additional \$11 M as co-PI and senior personnel at UDC

Reviewer for prestigious high impact factor journal (e.g. ACS Nano, Advanced Material,) and funding agencies (Irish Research Council, National Science Foundation)

Journal Publications (34):

- P. Tyagi, C. Riso, C. Rojas-Dotti, and F. Jose "SMM based Molecular Spintronics Devices" *RSC Advances*, Vol.10, 1306, 2020
- P. Tyagi, D. Brent, T. Saunders, T. Goulet, C. Riso, K. Klein, and F. Garcia-Moreno, "Electropolished Additively Manufactured 316 Steel Components," *International Journal of Advanced Manufacturing*, Vol.106, 1337–1344, 2020
- P. Tyagi, and C. Riso, "Magnetic Tunnel Junction Based Molecular Spintronics Devices Working as a Solar Cell," *Nanotechnology*, <https://doi.org/10.1088/1361-6528/ab3ab0> (In press, 2019)
- P. Tyagi, and C. Riso, "Magnetic force microscopy revealing long range molecule impact on magnetic tunnel junction based molecular spintronics devices," *Organic Electronics*, DOI: <https://doi.org/10.1016/j.orgel.2019.105421> (In press, 2019).
- P. Tyagi, C. Riso, and E. Friebe, "Magnetic Tunnel Junction Based Molecular Spintronics Devices Exhibiting Current Suppression At Room Temperature," *Organic Electronics*, vol. 64, pp. 188-194, 2019.
- P. Tyagi, T. Goulet, C. Riso, R. Stephenson, N. Chuenprateep, J. Schlitzer, *et al.*, "Reducing the Roughness of Internal Surface of an Additive Manufacturing Produced 316 Steel Component by Chempolishing and Electropolishing," *Additive Manufacturing*, vol. 25, pp. 32-38, 2019.
- P. Tyagi, T. Goulet, C. Riso, and F. Garcia-Moreno, "Reducing Surface Roughness By Chemical Polishing Of Additively Manufactured 3D Printed 316 Stainless Steel Components," *The International Journal of Advanced Manufacturing Technology*, vol. 100, pp. 2895-2900, 2019.
- P. Tyagi and T. Goulet, "Nanoscale Tantalum Layer Impacting Magnetic Properties Of Tunnel Junction-Based Molecular Devices," *MRS Comm.*, pp. 1-5, 2018.
- P. Tyagi and E. Friebe, "Large Resistance Change on Magnetic Tunnel Junction based Molecular Spintronics Devices," *J. Mag. Mag. Mat.*, vol. 453, pp. 186-192, 2018.
- P. Tyagi, "Surface Passivation with Sulfide and Fluoride Ions," *MRS Advances*, vol. 2, pp. 2915-2920, 2017.
- M. Thomas, P. Tyagi, C. Moore, and P. Hampton-Garland, "Student Presentation Based Effective Teaching (SPET) Approach for Advanced Courses," *American Research Journal of Humanities and Social Sciences*, vol. 3, pp. 2378-7031, 2017.
- P. Tyagi, E. Friebe, B. Jacquis, T. Goulet, S. Travers, and F. Garcia Moreno, "Taguchi Design of Experiment Enabling the Reduction of Spikes on the Sides of Patterned Thin Films for Tunnel Junction Fabrication," *MRS Advances*, vol. 2, pp. 3025-3030, 2017.
- E. Mutunga and P. Tyagi, "Patternable Rough Textured Gold Microwire for Neurochemical Sensing," *MRS Advances*, vol. 1, pp. 717-721, 2016.
- P. Tyagi, E. Friebe, and C. Baker, "Addressing the Challenges of Using Ferromagnetic Electrodes in Molecular Devices," *MRS Advances*, vol. 1, pp. 483-488, 2016.
- P. Tyagi, E. Friebe, and C. Baker, "Advantages of Prefabricated Tunnel Junction Based Molecular Spintronics Devices," *NANO*, vol. 10, p. 1530002, 2015 2015.
- P. Tyagi, E. Friebe, and C. Baker, "Addressing The Challenges Of Using Ferromagnetic Electrodes In The Magnetic Tunnel Junction-Based Molecular Spintronics Devices," *J.Nanoparticle Res.*, vol. 17, p. 452, Nov 2015.
- P. Tyagi, C. Baker, and C. D'Angelo, "Paramagnetic Molecule Induced Strong Antiferromagnetic Exchange Coupling on a Magnetic Tunnel Junction Based Molecular Spintronics Device," *Nanotechnology*, vol. 26, p. 305602, 2015.

- P. Tyagi, C. D'Angelo, and C. Baker, "Monte Carlo and Experimental Magnetic Studies Of Molecular Spintronics Devices," *NANO*, vol. 10, p. 1550056, 2015 2015.
- P. Tyagi, "Teaching A Course With Active Learning Approaches And Training Other Teachers About Deep Learning Strategies," *International Journal for Innovation Education and Research*, vol. 2, p. 14, 2014.
- P. Tyagi, "Molecule Induced Strong Coupling between Ferromagnetic Electrodes of a Molecular Spintronics Device " *Mater. Sci. Forum*, vol. 736, pp. 32-54, 2013.
- P. Tyagi, "Molecular Electronics And Spintronics Devices Produced By The Plasma Oxidation Of Photolithographically Defined Metal Electrode " *App. Phys. A: Mat. Sci. & Proc.*, vol. 108, pp. 529-536, 2012.
- P. Tyagi, "Fabrication of Tunnel Junction based Molecular Electronics and Spintronics Devices " *J. Nanoparticle Res.*, vol. 14, p. 1195, 2012.
- P. Tyagi, "Multilayer Edge Molecular Electronics Devices: A Review," *J. Mater. Chem.*, vol. 21, pp. 4733-4742, 2011.
- P. Tyagi, "Ultrathin TaOx Based Photovoltaic Device," *Thin Solid Films*, vol. 519, p. 2355, 2011.
- S. J. Papadakis, J. A. Hoffmann, D. Deglau, A. Chen, P. Tyagi, and D. H. Gracias, "Quantitative Analysis Of Parallel Nanowire Array Assembly By Dielectrophoresis," *Nanoscale*, vol. 3, pp. 1059-1065, 2011.
- B. Hu, N. Chopra, P. Tyagi, and B. Hinds, "Selective Lateral ZnO Nanowire Growth By Surface Diffusion On Nanometer Scale-Patterned Alumina On Silicon," *J. Mat. Res.*, vol. 26, pp. 2224-2231, Sep 2011.
- J. S. Randhawa, M. D. Keung, P. Tyagi, and D. H. Gracias, "Reversible Actuation of Microstructures by Surface-Chemical Modification of Thin-Film Bilayers," *Adv. Mater.*, vol. 22, p. 407, Jan 2010.
- P. Tyagi, D. Postetter, D. L. Saragnese, S. Papadakis, and D. H. Gracias, "Electrochemically Grown Rough Textured Nanowires," *J. Nanoparticle Res.*, vol. 12, p. 1065, 2010.
- P. Tyagi and B. J. Hinds, "Mechanism of Ultrathin Tunnel Barrier Failure Due to Mechanical Stress Induced Nano-Sized Hillocks and Voids," *J. Vac. Sci. Technol. B*, vol. 28, pp. 517-521, 2010.
- P. Tyagi, N. Bassik, T. G. Leong, J. H. Cho, B. R. Benson, and D. H. Gracias, "Self-Assembly Based on Chromium/Copper Bilayers," *J. Microelectromech. Syst.*, vol. 18, pp. 784-791, Aug 2009.
- P. Tyagi, D. Postetter, D. L. Saragnese, C. L. Randall, M. A. Mirski, and D. H. Gracias, "Patternable Nanowire Sensors for Electrochemical Recording of Dopamine," *Anal. Chem.*, vol. 81, p. 9979, 2009.
- P. Tyagi, "Molecular Spin Devices: Current Understanding and New Territories," *Nano*, vol. 4, pp. 325-338 2009.
- P. Tyagi, D. F. Li, S. M. Holmes, and B. J. Hinds, "Molecular Electrodes At The Exposed Edge Of Metal/Insulator/Metal Trilayer Structures," *J. Am. Chem. Soc.*, vol. 129, pp. 4929-4938, Apr 25 2007.

Patent Pending (2):

1. Pawan Tyagi, Trenched Bottom Electrode Based Molecular Spintronics Devices (Application # 16/102,732),
2. Pawan Tyagi and Devdas Shetty pumpless solar energy based air heater and method (Application #16059912)

Book chapter:

Magnetic Tunnel Junction Based Molecular Spintronics Devices, Author: **Pawan Tyagi**, Vol.8: Electronics and Photovoltaics, **ISBN: 1-62699-008-5**, Studium Press

Peer reviewed international conference publications (12):

- P. Tyagi, "Positive Intelligence Education for Enhancing Learning Skills of College Students," *Proc. ASME. IMECE2019, Volume 5: Engineering Education*, V005T07A009, November 11–14, 2019
Paper No: IMECE2019-12032 DOI: <https://doi.org/10.1115/IMECE2019-12032>
- P. Tyagi, "Student Presentation Based Teaching (SPET) Approach for Classes With Higher Enrollment," *Proc. ASME. IMECE2018, Volume 5: Engineering Education*, V005T07A035, November 9–15, 2018
Paper No: IMECE2018-88463, DOI: <https://doi.org/10.1115/IMECE2018-88463>
- P. Tyagi, J. Xu, L. Thompson, M. Thomas, C. Moore, S. Haghani, et al., "Experience of Multiple Instructors About Student Presentation Based Teaching (SPET) Approach," *Proc. ASME. IMECE2018, Volume 5: Engineering Education*, V005T07A034, November 9–15, 2018, Paper No: IMECE2018-88410
DOI: <https://doi.org/10.1115/IMECE2018-88410>
- P. Tyagi, T. Goulet, N. Chuenprateep, R. Stephenson, R. Knott, A. Reddick, et al., "Chemical Polishing Based Surface Finishing of 3D Printed Steel Components," *ASME 2018 International Mechanical Engineering Congress and Exposition*, vol. 2, p. V002T02A020, November 9–15, 2018 2018.
- P. Tyagi, T. Goulet, D. Brent, K. Klein, and F. Garcia-Moreno, "Scanning Electron Microscopy and Optical Profilometry of Electropolished Additively Manufactured 316 Steel Components," *ASME 2018 International Mechanical Engineering Congress and Exposition*, vol. 2, p. V002T02A019, November 9–15, 2018 2018.
- P. Tyagi, (2016) "Student Presentation Based Effective Teaching (SPET) Approach for Advanced Courses," *Proc. ASME. IMECE2016, Volume 5: Education and Globalization*, V005T06A026, November 11–17, 2016, Paper No: IMECE2016-66029, DOI: <https://doi.org/10.1115/IMECE2016-66029>
- Tyagi, P. (2014). *Easily Adoptable Interactive Teaching Practices and Students Progress Monitoring Strategies*. *Proc. ASME. IMECE2014, Volume 5: Education and Globalization*, V005T05A029, November 14–20, 2014, Paper No: IMECE2014-39118, DOI: <https://doi.org/10.1115/IMECE2014-39118>
- Tyagi, P., Baker, C., & D'Angelo, C. (2014). A Monte Carlo study of molecular nanostructure based spintronics devices. In *Nanotechnology (IEEE-NANO), 2014 IEEE 14th International Conference on* (pp. 377-381): IEEE.
- Tyagi, P., Baker, C., & D'Angelo, C. (2014). Tunnel junction testbed based molecular devices. In *Nanotechnology (IEEE-NANO), 2014 IEEE 14th International Conference on* (pp. 801-804): IEEE.
- D'Angelo, C., & Tyagi, P. (2013). Molecular Magnet Induced Transformative Effects in Molecular Spintronics Devices: A Monte Carlo Study. *MRS Proceedings*, 1508, mrsf12-1508-bb1505-1504.
- Tyagi, P., & D'Angelo, C. (2013). A Monte Carlo Study of Molecular Spintronics Devices. In *ASME 2013 International Mechanical Engineering Congress and Exposition* (pp. V010T011A058-V010T011A058): American Society of Mechanical Engineers.
- Tyagi, P. (2013). Room Temperature Current Suppression on Magnetic Tunnel Junction Based Molecular Spintronics Devices. *MRS Proceedings*, 1507, mrsf12-1507-aa1512-1534.
- Tyagi, P. (2013). Spin Photovoltaic Effect on Molecule Coupled Ferromagnetic Films of a Magnetic Tunnel Junction. In *ASME 2013 International Mechanical Engineering Congress and Exposition* (pp. V06BT07A039-V06BT007A039): American Society of Mechanical Engineers.
- Hoffmann, J., Miragliotta, J., Wang, J., Tyagi, P., Maddanimath, T., Gracias, D., & Papadakis, S. (2009). Scanning surface-enhanced Raman spectroscopy (SERS) of chemical agent simulants on templated Au-Ag nanowire substrates. In *SPIE Defense, Security, and Sensing* (pp. 73180D-73180D-73110): International Society for Optics and Photonics.

Tyagi, P., Li, D., Holmes, S. M., & Hinds, B. J. (2007). *Insulator Film Thickness to Fix the Spacing between Electrodes to Molecular Length Scale*. In *Nano/Micro Engineered and Molecular Systems, 2007. NEMS'07. 2nd IEEE International Conference on* (pp. 191-194): IEEE.

Tyagi, P., Li, D., Holmes, S. M., & Hinds, B. J. (2006). *Fabrication of Stable Molecular Electrode Using Patterned Edge of a Metal/Insulator/Metal Junction*. In *2006 6th IEEE International Conference on Nanotechnology. IEEE-NANO 2006, Vols 1* (pp. 70-73). New York: IEEE.

International conference and Invited Presentations:

Date	Nature of Conference	Role
9-11 August, 2019	10th North American Material Education Symposium (NAMES 2019)	Invited Speaker
16-18 July 2019	Boeing-Navy Additive Manufacturing Workshop	Invited Speaker
11 April, 2019	NAVAIR Meeting In Aerospace Division	Invited Speaker
14-18 January 2019	Intermag-MMM International Conference, Washington DC	Presenter
14-18 January 2019	Intermag-MMM International Conference, Washington DC	Co-Presenter
9-15 November 2018	ASME-International Mechanical Engineering Congress and Exposition Pittsburgh, PA	Session chair and presenter of 3 papers
1-4 August 2018	US-Korea Conference (UKC-2018) New York, NY	Invited speaker
7-9 April 2018	Industry Led Workshops at Kansas City Nuclear Security Complex, MO	Co-Presenter on 3 papers
2-6 April 2018	Material Research Society International Conference, Phoenix, AZ	Presenter of two papers
20-24 August 2017	254th ACS National Meeting in Washington, DC	Session chair, presenter of two papers
17-21 April, 2017	Materials Research Society Spring 2017 Phoenix AZ	Paper Presenter
2-6 November, 2016	ASME-International Mechanical Engineering Congress and Exposition Phoenix, AZ	Session chair, presenter of two papers
29November -4 December, 2015	Materials Research Society Fall Meeting, Boston, MA	To present four accepted papers
June 29-July 3 2015	Advance Functional Materials, Stony Brook University, NY USA	Session chair and presented one paper

Peer Reviewer and Editor:

- Associate Editor for Helion Elsevier Publishing journal. (2016-present)
- Associate editor International Journal of Energy Engineering (2014-present)
- Peer reviewer for ACS Nano, Advanced Materials, Additive Manufacturing, Dalton, Nanotechnology, Helion

- Faculty portfolio evaluator for University of Michigan, Flint, Fall 2019
- External subject matter expert for Irish Science Foundation.

Federal grants and research funding:

Support ~\$20 Million federal funding at UDC

Funding	Federal grant	Role in the grant	Funding duration	
			Start	End
\$4.8 M	National Science Foundation-CREST, Center of Nanotechnology Research and Education	PI	2019	2024
\$2.7 M	Department of Energy National Nuclear Security Agency (2019-2022) Consortium of Additive Manufacturing Post Processing Partnership (AMP3).	PI	2019	2022
\$200,000	NSF-Research Instrumentation Grant to Obtain Physical Property Measurement System	PI	2019	2020
\$2.8 M	NASA-MIRO: Center of Advanced Manufacturing	Co-PI	2019	2022
\$130,000	Department of Energy-National Nuclear Security Agency. Advanced Manufacturing and Pre and Post Processing	PI	2018	2019
\$7 M	NIST PREP Grant	Co-PI	2018	2023
\$200,000	National Science Foundation: A Monte Carlo and SQUID Magnetometer Study of Molecular Spintronics Devices	PI	2012	2016
\$600,000	Department of Energy-National Nuclear Security Agency. Work Force Development in the Advance Manufacturing	PI	2012	2018
\$200,000	Air force Office of Sponsored Research. Sputtering Machine and Atomic Force Enabled Molecular Spintronics and Nanomachnining Research at University of the District of Columbia	PI	2013	2014
\$42,000	Instrumentation grant from provost office Dye sensitized solar cell working as a lithium ion battery	PI	2012	2013
\$500,000	Department of Defense Instrumentation Grant for The acquisition of Metal Laser Sintering Machine	Co-PI	2017	2018
\$400,000	National Science Foundation Targeted Infusion proposal on: Course development for a 21 st Century Smart Grid Workforce.	Co-PI	2014	2017

\$200,000	National Science Foundation –ATE grant: Nanotechnology Education and Workforce Development”	Senior personnel	2014	2016
\$400,000	National Science Foundation Targeted Infusion proposal on: Course development for Renewable Energy Concentration	Senior personnel	2010	2013

Director of Research Capacity Building:

Nano microfabrication research laboratory (42-111B):

Made efforts for three years (2012-2019) for establishing this lab. These efforts include designing the lab layout from the scratch, designing the clean room, coordinating utility installation, and acquiring >\$500,000 federal funding for bringing research equipment.

Scanning electron microscopy and device characterization lab (32-C05)

With external funding and partial UDC support acquired, Phenom XL SEM, Atomic Force Microscope, Scanning Tunneling microscope and numerous device characterization resources with Federal funding. Collaborated with other Mechanical Faculty for further development and effective use.

Renewable Energy and Energy System (REES) Lab (42-111A):

Designed and established REES lab to support renewable energy concentration, research in energy harvesting, and outreach for boosting SEAS enrollment. Acquired Fuel cell trainer, Smart grid trainer, Wind turbine, Solar cells, Solar thermal water and air heater using NSF-Target Infusion Project funding.

Advance manufacturing laboratory (42-C13):

Dr. Shetty’s initiated and established this laboratory. I am supporting and equipping this laboratory with several 3D printers and other resources. So far, I have used Department of Energy funding to purchase CubeX Duo and Cube plastic printers. I also acquired Project 160 powder 3D printer. These printers have been supporting senior design projects, class projects, student competitions, summer programs for high school students and high school teachers etc.

Engaged >25 undergraduate students in research projects:

1. Advisor for graduate students: Andrew Grizzle, Wondwosen Demisse, Pius Suh
2. Josh Dillard, Gian Carlo
NNSA funded Postprocessing of Additive Manufacturing Research
3. Abdullah Aldossary, Mubarak Aldossary, Firas Alessa, Omar A
4. N. Chuenprateep, R. Stephenson, R. Knott, A. Reddick

5. Christopher Riso*, Tobias Goulet*, Cyree Beckett (Electrical), Gabriel Torres (Electrical), Stanley Travers*, Collin Baker*, Edward Friebe*, Jote Jinfesa, Christopher D'Angelo (Mathematics), Ghosh Isaac (Chemistry),
NSF funded Project: Fabrication of molecular spintronics devices
Output: Published number of journal papers and peer reviewed conference papers. Sent students to international and local conferences
6. Tobias Goulet*, Nelson Paz, Dennika Brent*, Patricia Nantume (Electrical)
White house's Maker for Change challenge: Vacuum tube based solar thermal water heater
Output: A successful prototype
7. Eva Mutunga and Afam Ishkwue
Patternable gold microwire based neurochemical sensor.
Output: Capstone thesis and a peer reviewed paper to appear in the Materials Research Society -2015 conferences.
8. Netra Simmons, Zachary Nokes, Melvin Kinnard,
Department of Energy funded numerous Advance Manufacturing projects.
9. Ismael D. Boureima and Adenike Ogunbode
DC Public Service Commission project on investigation of high heating bills for DC residents during 2009 winter.
10. Four XEROX research projects with numerous students

Student with * engaged in multiple projects

Partnership with other institutions and industries:

1. Consortium of Advance Manufacturing: Since 2012 I am leading and representing UDC in a group of several universities (Such as Howard University, Morgan State University, Hampton University, North Carolina A&T, Clark Atlanta University, Alabama A&M University, Lincoln University) and three Department of Energy manufacturing and research units (Kansas City Plant, Y12, and Oak Ridge National Laboratory)
2. Partnership with DC area National Laboratories
National Institutes of Standards and Technology (NIST)-Dr. Robert Shull and Dr. Brian Kirby
Naval Research Laboratory – Dr. Mark Johnson
NAVAir- Phan Nam
3. Active Research collaborations:
Prof. George Christou –University of Florida Gainesville
Dr. Brian Kirby, Scientist, NIST center of Neutron Research, USA
Dr. E. Carolina Sanudo, University of Barcelona, Spain
Dr. F. Jose, University of Valencia, Spain
Dr. Jean-Louis GALLANI, IPCMS-DMO, Strasbourg cedex 2, France