BOARD OF TRUSTEES
UNIVERSITY OF THE DISTRICT OF COLUMBIA
UDC RESOLUTION NO. 2026 - 20

SUBJECT: APPROVAL OF THE APPOINTMENT OF PAWAN TYAGI, PH.D., AS DISTINGUISHED PROFESSOR IN THE SCHOOL OF ENGINEERING AND APPLIED SCIENCES

WHEREAS, pursuant to D.C. Official Code § 38-1202.06(3), the Board of Trustees is authorized to establish or approve policies and procedures governing admissions, curricula, programs, graduation, the awarding of degrees, and general policy for the components of the University; and

WHEREAS, pursuant to 8B DCMR §1412.6, all appointments to the rank of Distinguished Professor shall be approved by the Board of Trustees; and

WHEREAS, Dr. Pawan Tyagi, Professor of Mechanical Engineering in the School of Engineering and Applied Sciences (SEAS) of the University of the District of Columbia (UDC), has petitioned the University to appoint him to Distinguished Professor as he is qualified; and

WHEREAS, pursuant to 8B DCMR §1412**,** Dr. Devdas Shetty, Dean of SEAS, in conjunction with the Division Chair and the Department and College Promotion and Tenure Committees, have conducted a thorough review of Dr. Tyagi's academic background and records of achievement in teaching, scholarship, and university and community service and recommends the appointment of Professor Tyagi to Distinguished Professor effective October 1, 2026; and

WHEREAS, Dr. Tyagi is recognized as a global leader in additive manufacturing and molecular spintronics devices, with pioneering contributions that have advanced nanoscale electronics, renewable energy systems, and high-performance manufacturing technologies, supported by a substantial body of scholarship including over 80 peer-reviewed journal publications, numerous patents, and extensive national and international presentations; and

WHEREAS, Dr. Tyagi has demonstrated exceptional leadership in research by founding and directing the NSF-CREST Center for Nanotechnology Research and Education (CNRE), securing and managing multi-million-dollar external funding, exceeding national research output targets, and establishing UDC as a recognized leader in nanotechnology and advanced manufacturing research; and

WHEREAS, the Chief Academic Officer and the President have affirmed the recommendation of appointment of Dr. Tyagi from Dean Shetty and the appropriate committees, and the President has forwarded the recommendation to the Board of Trustees.

NOW, THEREFORE, BE IT RESOLVED that the Board of Trustees of the University of the District of Columbia approves the appointment of Dr. Pawan Tyagi, School of Engineering and Applied Sciences, as Distinguished Professor effective October 1, 2026.

Submitted by the Academic & Student Affairs Committee: June 10, 2026

June 17, 2026

Approved by the Board of Trustees:

Warner H. Session
Chairperson of the Board

UNIVERSITY OF THE DISTRICT OF COLUMBIA
OFFICE OF THE CHIEF ACADEMIC OFFICER

APRIL MASSEY, PH.D.
CHIEF ACADEMIC OFFICER

April 27, 2026

Dr. Pawan Tyagi
School of Engineering and Applied Sciences
University of the District of Columbia

Dear Dr. Tyagi,

This letter is to inform you that I have reviewed and am recommending approval of your application for appointment to distinguished professor.

Having thoroughly evaluated your record of accomplishments in the domains of teaching, scholarship, and service, and having concurred with the recommendations of the Chair, Dean, and relevant review committee(s), my recommendation will now go to President Edington for final approval of the appointment.

All approved promotions and associated salary increases will be effective on October 1, 2026, subject to final budget approval by the government of the District of Columbia.

Congratulations on reaching this stage of the review process and thank you for your sustained commitment to student success and professional excellence. You are to be commended for submitting a strong narrative and supporting evidence of your achievements as a faculty member at the University of the District of Columbia.

Sincerely,

April Massey

President Maurice D. Edington

4/29/26
Date

UNIVERSITY OF THE DISTRICT OF COLUMBIA
SCHOOL OF ENGINEERING AND APPLIED SCIENCES

Office of the Dean

February 19, 2026

Dr. April Massey
Chief Academic Officer and Provost
University of the District of Columbia
Washington, DC 20008

Ref: Dr. Pawan Tyagi- Recommendation for elevation to the level of Distinguished Professor at the University of the District of Columbia

Dear Dr. Massey,

It is with my greatest enthusiasm that I nominate Dr. Pawan Tyagi, Professor of Mechanical Engineering, for the position of Distinguished Professor at the University of the District of Columbia. Dr. Tyagi is UDC's only faculty member listed among the world's top 2% scientists by Stanford University, based on his illustrious research accomplishments described below. He is a passionate educator who has consistently advanced experiential learning through more than 6 peer-reviewed publications on innovations in teaching methods and student learning.

Dr. Tyagi joined UDC in the Fall of 2010 as a Visiting faculty member and became an Assistant Professor in Spring 2012. He was promoted to Associate Professor with tenure in Fall 2016. Based on his impressive accomplishments in teaching, research, and service, Dr. Tyagi was promoted to the rank of Full Professor of Mechanical Engineering in Fall 2020. Dr. Tyagi's scientific and technological journey has been shaped by his innovations during his industrial career and postdoctoral fellowship at Johns Hopkins University. He had his bachelor's and master's degrees from the prestigious Indian Institute of Technology Roorkee and Kanpur, respectively. He received his PhD in Materials Science and Engineering from the University of Kentucky in 2008.

With this strong foundation in Mechanical Engineering and Materials Science, Dr. Tyagi made steady progress at UDC and earned national and international recognition as a world-class researcher. His body of work over the last 28 years has consistently applied fundamental mechanical engineering principles across multidisciplinary research in advanced manufacturing, biomedical engineering, computer technology, and renewable energy. Dr. Tyagi's work integrates different aspects of modern mechanical Engineering, such as materials behavior down to the nanometer scale, mechanical deformation, machine design, heat transfer, and system-level engineering. The contributions have resulted in solving fundamental problems ranging from nanoscale device stability to large-scale renewable energy systems.

Dr. Tyagi, with several pending and approved patents in nanoscale devices, is considered

an expert in specialized quantum computing hardware research and has been invited to panels at different conferences. Dr. Tyagi has been the most productive scholar in the School of Engineering and Applied Sciences and has consistently received an exemplary rating in faculty evaluation since 2012. He has been a PI or Co-PI on grants up to $ 20 M, with a distinctive record of securing continuous federal funding since 2012 to initiate and conduct transformative research.

Dr. Tyagi founded and directed a nanotechnology laboratory with federal grants and UDC encouragement from 2012-2018. His nanotechnology research became a major factor in securing several multimillion-dollar grants in 2019. Notably, the nanotechnology lab has been used for outreach to more than 1000 high school students, visitors, and funders. Dr. Tyagi has made a major contribution in leading the NSF-CREST Center for Nanotechnology Research and Education (CNRE). To date, CNRE Dr. Tyagi supports 13 UDC faculty members across multiple schools, 10 postdocs, 14 PhD students, 30 MS students, and 65 undergraduate students. The research output coming out of the CREST Center has brought scholarly distinction to UDC. Dr. Tygi led more than 160 international conference publications-raising UDC brand as a research university.

Dr. Tyagi has demonstrated his technical expertise in Additive manufacturing with his publications getting ~400 citations. His leadership in a multi-university-industry consortium from 2012 to 2018 made UDC the leader of the consortium funding from 2019-2023. Dr. Tyagi has been the director for the Department of Energy $2.8M Consortium grant involving Howard University, Morgan State University, Lincoln University, besides UDC, with a collective focus on the Additive Manufacturing Postprocessing Partnership (AMP^3) grant under DOE-NNSA. Dr. Tyagi significantly advanced minority-serving institutional participation in high-impact AM research, providing direct employment and internships for UDC students in globally reputed industries and federal labs like Oak Ridge National Lab (ORNL). His work in establishing surface engineering and post-processing capabilities at UDC has positioned our institution as a recognized voice in additive manufacturing research and talent development.

The NSF-funded CREST Center, led by Dr. Tyagi, provides student support for the new PhD program in SEAS. Dr. Tyagi's three PhD graduates have been highly successful in securing positions at reputable FDA-like employers, obtaining NSF grants to advance PhD work under postdoctoral scholarships, and developing entrepreneurial ventures based on patented inventions. With his DOE-NNSA and NSF-CREST grant, he leveraged support for >80% SEAS engineering PhD students mainly during the COVID period.

Since 2012, Dr. Tyagi has been able to attract >$3M extramural instrument funding to create a world-class research capacity at UDC. He has established several laboratories, including the Nano fabrication and measurement laboratory (42-111B); the Scanning electron microscopy and device characterization lab (32-C05); the Renewable Energy and Energy System (REES) Lab (42-111A) and supported the setting of Advanced Manufacturing Laboratory (42-C13). This lab has become indispensable for NASA-funded CAMSTAR, in which Dr. Tyagi has made a remarkable technical contribution as a Co-PI with >15 journal publications.

At UDC, Dr Tyagi has produced 11 patents in the areas of manufacturing and molecular quantum devices; his four patents are with his PhD students. Dr. Tyagi's patent-worthy innovations are inspiring a new generation of faculty and shaping efforts to create infrastructure to generate revenue from such intellectual property at UDC. Dr. Tyagi served as lead author or corresponding author on 110 peer-reviewed publications from his research team (66 journal articles and 44 conference papers). Dr. Tyagi has also published a book about his own additive manufacturing research. Dr. Tyagi's research impact is reflected in rapidly increasing citations. According to Google Scholar, his research has been cited ~1,000 times since 2020. Dr. Tyagi has co-authored 24 papers with colleagues at NIST, the Kansas City Nuclear Security Complex, ORNL, and international institutions, including the University of Valencia, Spain.

Dr. Tyagi has been a scholar-teacher throughout his career at UDC. He attended the Myrtilla Miner Faculty Fellowship twice and developed the student presentation-based experiential teaching (SPET) method. Dr. Tyagi has published eight peer-reviewed papers on SPET, including one on the adoption of online engineering teaching during COVID-19. Dr. Tyagi is also credited with incorporating Positive Intelligence® (PI) training to enhance students' academic performance and enable them to realize their full potential in their future careers. In 2023, NSF invited him to give a workshop for 36 CREST centers at the annual meeting in Salt Lake City.

In addition, his contributions have appeared at prestigious international conferences, including the American Society of Mechanical Engineers (ASME), IEEE-Nano, Magnetism and Magnetic Materials, and the Electronic Materials Conference (EMC). Dr. Tyagi has mentored research that has been presented at>130 conferences. Based on his productive research, as demonstrated at the conference, Dr. Tyagi was unanimously elected to serve as a member of the EMC organizing committee for 3 years.

Dr. Tyagi's extraordinary success in securing $12 million as PI, conducting productive research, and producing world-class PhD students has contributed to UDC's achievement of the Research Colleges and Universities (RCU) Carnegie classification, awarded to institutions that spend $2.5M/year on research. His extensive experience securing large, center-like grants and leading large research groups makes him a highly valuable faculty member toward UDC's institutional goal of achieving R2 Carnegie classification and becoming increasingly research-active, PhD-granting 21st Century HBCU.

Dr. Tyagi's outstanding contribution to the field of Mechanical Engineering can be summarized as:

- Inventor of a magnetic tunnel junction-based molecular spintronics device (MTJMSD) (Tyagi, JACS, 2007)
- Manufactured first 30 nm Patternable Nanowire Neurochemical sensor (Tyagi, 2009, Analytical Chem.)
- Developed the self-created Monte Carlo Simulation program explaining experimentally observed unprecedented room temperature molecular coupling between two ferromagnets (Tyagi, 2015, Nanotechnology)

- Invented a novel magnetic tunnel junction-based molecular spintronics device, which is used as a solar cell. (Tyagi, Nanotechnology 2019, Marzieh, 2024, ACS Applied Electronics Materials)
- Solving a 70-year-old molecular device manufacturing roadblock via trench bottom electrode-based spintronics devices for harnessing ~1 nm length scale molecules. (Patented-USPTO, 2020)
- Quantum computer hardware suitable for three-terminal trenched bottom electrode-based molecular devices with a gate electrode to manipulate ferromagnet-molecule entangled states. (Patented, USPTO, 2022)
- Solving industrial problem of internal surface cleaning: Chempolishing-based interior surface cleaning of AM steel components (Tyagi, 2019, Additive Manufacturing)
- Invented room temperature metal 3D printing: 3D Printing of electrochemically bonded metallic microscopic particles and self-cleaning nozzle for dispensing metal powder continuously (Patent pending 2022, 2023).

Views from National Experts

Dr. Tyagi's contributions to the field can be examined from the viewpoint of external reviewers, who are national experts in Mechanical Engineering. Amongst the list of distinguished experts in manufacturing engineering, **Dr. Amy Elliott, Group Leader, Systems Automation and Monitoring Research Manufacturing Science Division, Oak Ridge National Laboratory** says the following:

"Dr. Tyagi's pioneering work in post-processing of metal additive manufacturing (AM) components—particularly in internal surface finishing—is one of his most influential contributions. Beginning with his collaboration with the Kansas City National Security Campus (KCNSC) under DOE-NNSA sponsorship, Dr. Tyagi produced a series of rigorously designed and impactful studies from 2016 to 2024. These include work presented at ASME-IMECE and the Additive Manufacturing journal, where he implemented Taguchi Design of Experiments to optimize chemical and electrochemical polishing of AM parts. His 2019 paper in Additive Manufacturing (impact factor >7), which demonstrated effective internal surface roughness reduction in stainless steel AM parts, remains a heavily cited work—garnering over 245 citations to date. This advancement is of considerable importance to high-reliability industries like aerospace, defense, and medical devices, where surface integrity directly affects fatigue life and corrosion resistance.

What truly distinguishes Dr. Tyagi's work is his deep integration of research innovation with student mentorship and inter-institutional leadership. He has successfully guided numerous undergraduate, master's, and PhD students in additive manufacturing, often engaging them as co-authors in peer-reviewed journals and as co-inventors on patent applications. His lab has developed in-house surface characterization protocols using SEM, profilometry, and optical inspection systems—ensuring students gain hands-on experience with both design and diagnostics. Equally impressive is Dr. Tyagi's role in building infrastructure at UDC. He has led the creation of a Nanoscale Fabrication and Measurement Laboratory that includes a class-1000 cleanroom, electrochemical

polishing stations, high-resolution microscopy, and AM hardware platforms. These resources not only support his own research but also serve as a launchpad for new researchers and faculty across the university. Dr. Tyagi's work is fully aligned with national priorities in sustainable and intelligent manufacturing. His grants from NSF, DOE, and AFOSR, his student-centered innovation model, and his forward-looking contributions in hybrid materials and non-thermal manufacturing workflows make him a critical asset to the national research ecosystem.

Dr. Elliott concludes her letter by saying Dr. Pawan Tyagi has demonstrated an exceptional blend of technical innovation, academic leadership, student impact, and institutional transformation. His trajectory is precisely what the Distinguished Professor rank is designed to recognize. His vision is bold, his execution is disciplined, and his impact on science, students, and the AM community—is profound."

External reviewer **Dr. John Philip Professor and Chair, Department of Physics the Catholic University of America** says, "*Dr. Tyagi's pioneering research represents a bold and innovative step beyond this technological plateau. His approach leverages mass-manufacturable MTJ structures as testbeds for realizing molecular spintronics devices—an area that merges the principles of magnetism, quantum mechanics, and molecular electronics. This research opens vast new opportunities for innovation, expanding MTJ applications beyond memory devices toward next-generation computing and hybrid functional materials. His work focuses on harnessing the quantum spin states of molecular nanomagnets to develop transformative device concepts. Dr. Tyagi's CV lists two awarded U.S. patents and several pending patents in MTJ-based molecular devices. These patents highlight futuristic technologies that could position UDC as a global leader in molecular spintronics. His pending patents also explore novel applications of molecular spintronics in biochemical sensing and renewable energy harvesting.*

Notably, his 2019 paper in Nanotechnology was the first to report on the spin-based photovoltaic effect in molecular spintronics devices. This landmark study demonstrated his mastery of advanced optical and spectroscopic techniques to probe device mechanisms. One of his pending patents proposes large-scale spin-photovoltaic solar cells that utilize earth-abundant and recyclable metals such as iron, offering a sustainable and cost-effective route to solar energy conversion."

The external reviewer **Dr. Constantine Tarawneh is currently the Louis A. Beecherl, Endowed Professor in Mechanical Engineering and Distinguished Teaching Professor and Director, NSF CREST MECIS Center, The University of Texas Rio Grande Valley (UTRGV)** says the following: "*Critically, Dr. Tyagi's vision extends far beyond his own research group. He has architecturally designed the CREST Center to serve as a multi-dimensional support system for the entire UDC STEM faculty, providing them with access to equipment, seed funding, and collaborative opportunities. This deliberate strategy of empowering his peers has catalyzed a university-wide research renaissance, fostering a truly collaborative intellectual environment. This cultivation of a robust, sustainable research culture is perhaps his most significant contribution. Dr. Tyagi is uniquely qualified and experienced in sustaining the NSF-CREST Center beyond*

its initial funding. His model of offering a wide range of services—from specialized fabrication and characterization to K-12 outreach programs—provides a framework for generating revenue and ensuring the center's longevity. His efforts—securing over $20 million in federal funding, establishing core research laboratories, mentoring a generation of PhDs, and driving a high-volume, high-impact publication engine—were indisputably indispensable in achieving UDC's newly earned Carnegie Research classification. He has been a principal architect in transforming UDC into a recognized research university, and his work embodies the very mission of a land-grant institution."

External reviewer, **Dr. Kai Liuis is Professor and McDevitt Chair Fellow, National Academy of Inventors Fellow, at Georgetown University** says the following:
"His UDC group has systematically studied the impact of device fabrication parameters to improve the design of successful device fabrication. Dr. Tyagi's research is very versatile and allows a large variety of molecules to be integrated into device forms. His current research paves the path to experiment with a large number of molecules out of billions of possible molecular structures and hence opens the floodgate of possibilities of making novel devices. Dr. Tyagi has pioneered the field of molecule-multilayer-based metamaterials, and ***according to the best of my knowledge, his UDC's group is the only one actively researching in this direction; his unique and pioneering research put UDC in the forefront.*** *Dr. Tyagi is first researcher to covalently bond the paramagnetic molecules between the two ferromagnetic films of a magnetic tunnel junction and published his findings in 2007, Journal of the American Chemical Society. He and his undergraduate students demonstrated how a magnetic molecule can produce unprecedented inter-ferromagnetic electrode coupling (Tyagi et al., 2015, Nanotechnology). His multiple publications have shown that molecule-induced strong exchange coupling can transform a conventional magnetic tunnel junction into a fascinating physical system. In 2019 alone Dr. Tyagi's UDC group published three papers highlighting novel phenomena with magnetic tunnel junction based molecular spintronics devices. One of the most intriguing results is the observation of spin-based photovoltaic effect on molecular spintronics devices."*

External reviewer, **Dr. Kimberley Cousins, Professor of Chemistry, Biochemistry Director, Center for Advanced Functional Materials at California State University in San Bernardino, CA** says, *"Dr. Tyagi is an internationally recognized expert in* ***molecular spintronics****, with a focus on developing* ***magnetic tunnel junction-based molecular devices (MTJMSDs)*** *that hold promise for the next genera(on of computing, memory, and energy devices.*
His approach diverges from traditional approach and instead integrates ***quantum-active molecular nanostructures*** *into spintronic architectures. Dr. Tyagi exemplifies the qualities of a* ***Distinguished Professor****—a scholar whose sustained Innovation, research leadership, mentorship, and institutional vision have brought national visibility and global recognin to UDC. His work continues to push the boundaries of nanoscale device engineering, and his mentorship has transformed UDC into a hub for molecular-scale science."*

External reviewer **Dr. Maria Tamargo, Distinguished Professor of Chemistry and Director, NSF CREST Center IDEALS, The City College of New York** indicates the

following: "*Dr. Tyagi's 2018 publication in the Journal of Magnetism and Magnetic Materials is a landmark study that showcased unprecedented potential in molecular devices, demonstrating an extraordinary >100,000% on-off ratio. Although these early devices required further stabilization, the magnitude of these findings is historically significant, particularly when one recalls that the entire spintronics revolution began 30 years ago with only ~20% on-off ratio. The implications of Dr. Tyagi's work echo from the early days of spintronics, which went on to power the core memory systems in modern computers. I am especially impressed by Dr. Tyagi's ability to lead both experimental and theoretical studies in the highly complex and emerging field of molecular spintronics. He has published more than 40 peer-reviewed papers in this domain, establishing himself as a recognized subject matter expert. This combination of deep experimental insight with theoretical innovation is rare and adds to the transformative potential of his work. "*

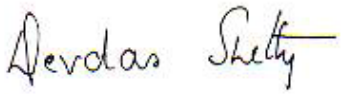
Dr. Satilmis Budak, Professor, MSEE Coordinator, Alabama A&M University, Huntsville, says the following: *"Given my strong background in physical vapor deposition and the physical properties of thin films, I commend Dr. Tyagi's careful work on device stability. He has not only published astounding results but also shared the process of making those devices via multiple dedicated papers, as listed below. Dr. Tyagi's group at UDC is the first to provide an in-depth understanding of the oxidation issue critical for making stable molecular devices. This paper reveals that researchers do not need to be paranoid about the oxidation of metal electrodes below 90 degrees centigrade. His research investigated a broad spectrum of magnetic materials to address the oxidation issue, thereby bridging the longstanding knowledge gap in the following paper: P. Tyagi et al., "Addressing The Challenges Of Using Ferromagnetic Electrodes In The Magnetic Tunnel Junction-Based Molecular Spintronics Devices," J. Nanoparticle Res., Article vol. 17, no. 11, p. 452, 2015, 452. UDC. Dr. Tyagi also published groundbreaking insights into the role of mechanical stresses in nanoscale insulator failure (Tyagi et al., JVST, 2010). Dr. Tyagi's expertise in materials and nanoscale materials and device design makes him uniquely suited to lead UDC's entry in other high-impact areas where ultrathin tunnel barriers are critical for operation, including Josephson Junctions used for superconducting qubit technology."*

Dr. Tyagi has demonstrated continued excellence in teaching, research and service throughout his career. In summary, I wish to add that I have always been impressed by Dr. Tyagi's high standards and his truly humane qualities besides his scientific and technical competence. His contributions have brought credit to UDC. Dr. Tyagi has met the scholarly, teaching and service requirements for advancing to the level of Distinguished Professor. **Dr. Tyagi embodies the qualities and achievements one would expect of a Distinguished Professor, and I strongly recommend him for this position.**

At UDC, Dr. Tyagi has been awarded the Institutional Excellence in Funding (2019), Excellence in Teaching (2022), and Excellence in Research (2025) awards. Dr. Tyagi was also awarded the Innovator of the Year award at the 2019 National BEYA conference. Based on my direct observation, external reviews, and awards for Dr. Tyagi's

distinguished achievements in research, teaching, and service, I strongly support his promotion to the distinguished professor rank.

Kind regards,



Devdas Shetty, Ph.D., P.E.,
Dean/Professor of Mechanical Engineering and Distinguished DOE Chair
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UNIVERSITY OF THE DISTRICT OF COLUMBIA
SCHOOL OF ENGINEERING AND APPLIED SCIENCES

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February 15, 2026

Subject: Endorsement letter for promotion of Dr. Pawan Tyagi to the rank of Distinguished Professor

Dear Dean Shetty,

It is my distinct honor and privilege to write this endorsement letter in strong support of Dr. Pawan Tyagi's application for promotion to the rank of Distinguished Professor in the Department of Mechanical Engineering at the University of the District of Columbia (UDC). When I came to UDC in fall of 2012, there were only two ME faculty: Dr. Tyagi and then Chair, Dr. Adebayo. At the time Dr. Tyagi had only recently been hired a year prior as a tenure-track assistance professor but he already had a research lab going and went on to spearhead research and curriculum in the areas of energy, nanotechnology and advanced manufacturing. We went from a department of only a handful majors on the verge of being cut to now the largest engineering discipline at UDC. This is in no small part due to the leadership and impact of Dr. Tyagi. I now write from my perspective as Department Chair and my intimate knowledge of Dr. Tyagi's work, having authored his departmental evaluation for promotion to the rank of Full Professor in 2020. The trajectory of Dr. Tyagi's accomplishments since that time has been nothing short of extraordinary, and I believe his record amply satisfies the criteria set forth in 8 DCMR § 1412.

I. Confirmation That Dr. Tyagi Meets All Requirements for the Rank of Professor

In my February 2020 evaluation, I strongly recommended Dr. Tyagi for promotion to Full Professor based on a sustained and exceptional record across teaching, research, and service. At that time, he had authored 27 peer-reviewed journal articles, held an h-index of 12 with 532 citations, brought in $8.85 million as Principal Investigator and participated in an additional $11.2 million as Co-PI, filed two U.S. patents, founded and directed the Nanotechnology Fabrication and Measurement Laboratory, and received the prestigious BEYA STEM Innovator Award. His teaching record was exemplary, and he had served the department faithfully as Curriculum Chair for seven years and as our inaugural Graduate Program Director.

Since achieving the rank of Full Professor, Dr. Tyagi has continued to satisfy, and substantially surpass, every standard associated with that rank. His performance evaluations have remained at the highest rating of "distinguished" for thirteen consecutive years. He continues to teach core and graduate courses with distinction, mentors doctoral students through to completion, and contributes substantively to departmental, school-level, and university governance. I affirm without reservation that Dr. Tyagi fully meets all requirements for the rank of Professor.

II. Outstanding Professional Distinction Beyond the Rank of Professor

The regulation governing the rank of Distinguished Professor (8 DCMR § 1412.4) requires that a candidate have achieved outstanding professional distinction in research, creative accomplishments, teaching, service to higher education, or public service. Dr. Tyagi has achieved that distinction across all of these dimensions simultaneously, which is a rare combination that I believe places him firmly in distinguished category.

A. National and International Recognition in Research

Since becoming a Full Professor five years ago, Dr. Tyagi has published 40 additional peer-reviewed journal articles, bringing his total to more than 66 journal papers and 43 conference proceedings, along with a book published in 2025. His citation count has grown to 1,760 total citations (1,100 in the last five years alone), and his h-index has risen to 22. His ResearchGate research interest score places him above 87% of the approximately 25 million scientists on that platform — a meaningful benchmark of global peer recognition. In manufacturing engineering specifically, his score ranks above 90% of researchers worldwide. *Just this fall he was recognized by Stanford University's World's Top 2% Scientists Network (https://topscinet.com/).*

In the field of tunnel junction-based molecular spintronics devices (MTJMSDs), Dr. Tyagi has established UDC as the preeminent research center in the United States — a distinction typically reserved for R1 research universities and federal laboratories. His group has demonstrated experimentally unprecedented phenomena including molecule-induced photovoltaic effects and current on/off ratios exceeding 100,000%, with collaborations spanning NIST, Oak Ridge National Laboratory, NASA, and international institutions including the University of Barcelona. In additive manufacturing, his 2019 paper on internal surface finishing of 3D-printed steel components has become one of the most-cited original works globally in the field of AM post-processing, drawing sustained attention from both academic researchers and industry.

Dr. Tyagi's intellectual property portfolio now encompasses 15 patents (4 awarded and 7 pending), with 4 additional inventions institutionally approved and in preparation. This level of patent generation by a faculty member at a teaching-focused urban university is, to my knowledge, without precedent in UDC's history. Notably, he successfully obtained authorization from both the National Science Foundation and the Department of Energy to use external grant funds to cover patent filing costs, a creative and administratively sophisticated solution that expanded UDC's IP portfolio without drawing on institutional resources.

B. Sustained Leadership in Federal Research Funding

Dr. Tyagi has attracted and managed approximately $20 million in federal research funding over his career at UDC, spanning the NSF, DOE-NNSA, NASA, NIST, and the Air Force Office of Scientific Research. This level of external funding is unprecedented in the School of Engineering and Applied Sciences and reflects the national standing Dr. Tyagi has achieved as an independent researcher. His flagship achievement in this domain is his leadership of the $4.9 million NSF-CREST Center for Nanotechnology Research and Education (CNRE), which he has directed since 2019. Under his leadership over six years, the Center has produced 44-plus journal papers, 38 conference proceedings, 170 presentations, and 6 awarded patents, exceeding its original NSF performance targets in every measurable category.

Additionally, from 2019 to 2023, Dr. Tyagi served as lead Principal Investigator and Director of the $2.7 million DOE-NNSA Additive Manufacturing Post-Processing Partnership (AMP³) Consortium — a multi-institutional collaboration that he was unanimously selected to lead by a coalition of three HBCUs and three DOE industry and laboratory partners. The consortium was named after his pioneering research, a recognition that speaks directly to the national distinction his work has earned. Through AMP³, four UDC students secured permanent positions at DOE national security facilities.

C. Distinction in Teaching Innovation and Service to Higher Education

Dr. Tyagi's contributions to the practice of higher education extend well beyond his home institution. He invented the Student Presentation-Based Effective Teaching (SPET) methodology, which has been published in multiple juried ASME IMECE conference proceedings and adopted in faculty development workshops at UDC and at national and international venues. He has conducted three SPET workshops for UDC faculty and has been invited to present at the NSF's annual CREST Principal Investigator Meeting and at Stanford University. This recognition by peers at a leading

research university and the National Science Foundation speaks to the quality and originality of his pedagogical contributions.

Building on SPET, Dr. Tyagi pioneered the integration of Positive Intelligence (PI) training into engineering education, a nationally novel approach that develops students' resilience, self-awareness, and professional capacity alongside technical skills. His results have been published in EDULEARN and ICERI proceedings and have attracted invitations to present at international universities. He received UDC's University-Wide Excellence in Teaching Award in 2022, followed by the University-Wide Scholar Award in 2024. These awards are the clearest possible statement that UDC itself recognizes Dr. Tyagi's contributions as exceptional.

As the founding Graduate Program Director of the Department of Mechanical Engineering's MS and PhD programs, Dr. Tyagi has shaped the graduate education infrastructure of this department from the ground up. He has personally mentored more than 10 doctoral students, including UDC's first CNRE-funded PhD graduates who went on to secure NSF Postdoctoral Research Fellowships and competitive industry positions. He supported 17 graduate students (14 MS and 3 PhD) through CNRE alone, far exceeding the center's original target of 10. His creation of recruitment pathways from community college to doctoral study, in partnership with Lincoln University and UDC Community College, has produced UDC's first cohort of minority nanotechnology doctorates.

D. Transformative Institutional Leadership and Infrastructure Building

Perhaps no single contribution better captures the scope of Dr. Tyagi's distinction than what he has built for this institution. Since 2012, he has established and directed the Nanotechnology Fabrication and Measurement Laboratory (NFML), which now houses a scanning electron, an atomic force microscope, Physical Property Measurement System, cryogenic probe stations, and thin-film deposition systems, infrastructure that has enabled more than 20 UDC faculty members across mechanical engineering, electrical engineering, chemistry, civil engineering, and the community college to initiate externally funded research programs. His laboratory enabled UDC's first NASA SBIR/STTR award and supported the $5 million NASA-MUREP Center for Advanced Manufacturing.

Dr. Tyagi has also led innovation and commercialization training that extends beyond the School of Engineering. He currently supervises a cross-college team of four PhD students (including three from the College of Agriculture, Urban Sustainability and Environmental Sciences) in developing an AI-powered commercialization support tool designed to assist institutions that lack structured IP office resources. Under his mentorship, this team won the $10,000 award at the 2025 HBCU Innovative Solutions Program at the National HBCU Symposium, hosted at Howard University. This cross-disciplinary entrepreneurial leadership represents a form of service to the broader higher education community that the Distinguished Professor designation is specifically designed to recognize.

E. National Awards and Public Recognition

The national and international recognition Dr. Tyagi has received is consistent with the standard of outstanding professional distinction required for this rank. He received the National STEM Innovation Award at the BEYA STEM Conference in Washington, DC in 2020. He has been invited to present at federal agencies, national laboratories, Boeing and NAVAIR engineering workshops, Stanford University, international universities in Spain, and at NSF national PI meetings. His community outreach has included nearly 250 high school students taught over a decade through Johns Hopkins University's Engineering Innovation summer program, sustained participation in Maker Fairs and Career Days, and supporting training of approximately 80 community college students annually in nanotechnology fundamentals through UDC-CC’s Intro to Nanotechnology course.

III. Conclusion

Having observed Dr. Tyagi's career closely since I first endorsed him for promotion to Full Professor in 2020, I can state with confidence that his subsequent accomplishments have been not merely consistent with his prior record but qualitatively transformative for this institution. He has built a research enterprise that any R1 university would be proud to claim. He has mentored students into careers at national laboratories, federal agencies, and leading universities. He has developed pedagogical innovations that are now disseminated nationally and internationally. He has attracted and managed a federal research portfolio of a scale rarely seen at an institution of UDC's size and mission.

The rank of Distinguished Professor exists precisely to recognize faculty who have achieved what Dr. Tyagi has achieved: sustained, multidimensional excellence that brings lasting distinction to their institution and to their field. Dr. Tyagi meets that standard fully and without qualification. I endorse his application with the strongest possible recommendation.

Respectfully submitted,

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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 Rookee (IITR)	Materials Sci.and Eng.	B.S. (1994-1998)

Employment History:

October 2020-Present	Professor	University of the District of Columbia
October-2016-October 2020	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	Graduate teaching assistant,	Indian Institute of Technology(IITK)
July 1998-July 2000	Quality control engineer,	MIDHANI Alloy and Steel Plant
July 1997-June 1998	Research assistant,	Indian Institute of Technology(IITR)

Research: Citations, quality, and impact:

15 Patents,
80 ISI Indexed Journal Articles,
44 Conference Papers,
2 Book/chapter(141)

1050 Google Citation during the professorship duration at UDC (1659 total)
1150 downloads of Molecular Spintronics Resaerch internationally.
Founder and director of the Center for Nanotechnology Resaerch and Education (CNRE)
Founder and director of Nanotechnology Fabrication and Measurement Laboratory(NFML)
3PhD (6 PhD theses in progress) and 10 MS theses supervised.
Global Expertise: (**150** Conference presentations and Invited Talks in last 10 years at UDC)

Unique contributions:

1. Inventor of magnetic tunnel junction based molecular spintonics device (MTJMSD) (Tyagi, JACS, 2007)
2. 30 nm Patternable Nanowire Neurochemical sensor (Tyagi, 2009. Analytical Chem.)
3. Self-created Monte Carlo Simulation program explaining experimentally observed unprecedented room temperature molecular coupling between two ferromagnets (Tyagi, 2015, Nanotechnology)
4. 1M % magneto resistance with MTJMSD (Tyagi, 2018. JMMM)
5. 10K Molecular bridges creating unprecedented highly correlated materials at RM (Tyagi, 2019, Organic Electronics).

6. MTJMSD based spinphotovoltaic solar cells (Tyagi, Nanotechnology 2019, Marzieh, 2024, ACS Applied Electronics Materials)
7. Chempolishing based interior surface cleaning of AM steel components (Tyagi, 2019, Additive Manufacturing)
8. 3D Printing of electrochemically bonded metallic microscopic partcicales and self-cleaning nozzle for dispensing metal powder continuously (Patent pending 2023).
9. Patented: Trenched bottom electrode based spintronics devices for harnessing ~1 nm length scale molecules.
10. Patented: Three Terminal trenched bttom electrode based molecular devices with Gate electrode to manipulate ferromagnet-molecule entangled states.

Journal Publications (80):

1. Wondwosen Demisse and Pawan Tyagi (2025). Reciprocating-Rotating mixer-based Powder Delivery System Giving Continuous Metal Particles Flow in Aqueous Media during Powder-based Electrochemical Metal Additive Manufacturing, Nature Communications(Under 2nd Review)
2. O. Kirkland, C. D'angelo, J. Estevez Hernandez, and P. Tyagi, (2025)Monte Carlo Study of Exchange Coupling in Magnetic Tunnel Junction Molecular Spintronic Devices with Increasing Electrode Size (Under 2nd Review Journal of Magnetism and Magnetic Materials)
3. B. Bari, U. Udeochu, X. Song, and P. Tyagi(2025), "Spectral Characterization of the Synthesis of Thiol-Functionalized Tetraphenyl Porphyrin for Spintronic Applications," Journal of Electronic Materials, 2025/08/04 2025, doi: 10.1007/s11664-025-12192-z.
4. Bari, B., P. Tyagi and U. Udeochu (2025). "Cyclic voltammetry insights into Ni/Al-carbonate hydrotalcite catalysis for methanol oxidation." Scientific Reports **15**(1): 13365.
5. Mohammed, R. and P. Tyagi (2025). "Internal geometrical planetary-radial features impact on fluid flow and heat transfer inside the microchannel." Progress in Engineering Science **2**(2): 100085.
6. Tyagi, P. (2025). "Magnetic force microscopy revealing long-range room temperature stable molecule bridge-induced magnetic ordering on magnetic tunnel junction (MTJ) pillars." AIP Advances **15**(3).
7. Amir, U., P. Tyagi, C. D'Angelo and P. Tyagi (2025). "Impact of Number of Paramagnetic Nanostructure Coupled with Two Ferromagnetic Electrodes of a Cross-Junction Shaped Molecular Spintronics Device at Different Thermal Energies." IEEE Transactions on Magnetics: 1-1.
8. Grizzle, A. C., C. D'Angelo and P. Tyagi (2025). "Interplay between Octametallic molecular cluster spin channels and magnetic tunnel junction Magnetization: A Monte Carlo study." Journal of Magnetism and Magnetic Materials 614: 172755.
9. Sankhi, B. R., E. Peigney, H. Brown, P. Suh, C. Rojas-Dotti, J. Martínez-Lillo and P. Tyagi (2025). "Single molecule magnet's (SMM) effects on antiferromagnet-based magnetic tunnel junction." AIP Advances 15(3).
10. Sankhi, B. R., C. D'Angelo and P. Tyagi (2025). "Study of the Dzyaloshinskii-Moriya Interaction in Magnetic Tunnel Junction-Based Molecular Spintronic Devices with Antiferromagnetic-Ferromagnetic Electrodes." IEEE Transactions on Magnetics: 1-1.
11. Sankhi, B. R., C. D'Angelo, D. Thompson and P. Tyagi (2025). "Effect of Dzyaloshinskii Moriya interaction on magnetic tunnel junction based molecular spintronics devices (MTJMSD)." Scientific Reports 15(1): 5576.
12. Sankhi, B.R., E. Peigney, H. Brown, P. Suh, C. Rojas-Dotti, J. Martínez-Lillo and P. Tyagi (2024). "Single-molecule Magnets (SMM) spin channels connecting FeMn antiferromagnet and NiFe ferromagnetic electrodes of a tunnel junction." Journal of Magnetism and Magnetic Materials 611: 172608.
13. Suh, P. K., A. Grizzle, E. Mutunga, B. Dahal, C. D'Angelo and P. Tyagi (2024). "Intra-molecular coupling within double-segmented molecules impacting magnetic tunnel junction-based molecular spintronics devices." MRS Communications 14(1): 103-113.
14. Suh, P. and P. Tyagi (2024). "Photovoltaic effect on silicon–alumina–ferromagnet tunnel junction providing insights about spin-dependent molecular spintronics solar cells." AIP Advances 14(3).

15. A. C. Grizzle, A. Elliott, K. L. Klein, and P. Tyagi, "Surface Finishing and Coating Parameters Impact on Additively Manufactured Binder-Jetted Steel–Bronze Composites," Materials, vol. 17, p. 598, 2024.
16. Demisse, W., P. Sanchez Guerrero, D. Fulford, L. Rice, K. L. Klein and P. Tyagi (2024). "Electroless nickel plating of electropolished and chempolished Additively Manufactured (AM) steel components in various surface orientations." The International Journal of Advanced Manufacturing Technology **134**(3): 1533-1546.
17. B. N. Mengesha, A. C. Grizzle, W. Demisse, K. L. Klein, A. Elliott, and P. Tyagi, "Machine Learning-Enabled Quantitative Analysis of Optically Obscure Scratches on Nickel-Plated Additively Manufactured (AM) Samples," Materials, vol. 16, p. 6301, 2023.
18. E. Mutunga, C. D'Angelo, and P. Tyagi, "Magnetic molecules lose identity when connected to different combinations of magnetic metal electrodes in MTJ-based molecular spintronics devices (MTJMSD)," Scientific Reports, vol. 13, p. 16201, 2023/09/27 2023.
19. M. Savadkoohi, D. Gopman, P. Suh, C. Rojas-Dotti, J. Martínez-Lillo, and P. Tyagi, "Spin Solar Cell Phenomenon on a Single-Molecule Magnet (SMM) Impacted CoFeB-Based Magnetic Tunnel Junctions," ACS Applied Electronic Materials, 2023/05/31 2023.
20. P. Tyagi, "New value of old knowledge: sulphur-based GaAs surface passivation and potential GaAs application in molecular electronics and spintronics," Materials Research Express, vol. 10, p. 042003, 2023.
21. W. Demisse, J. Xu, L. Rice, and P. Tyagi, "Review of internal and external surface finishing technologies for additively manufactured metallic alloys components and new frontiers," Progress in Additive Manufacturing, 2023/02/18 2023.
22. J. Dillard, A. Grizzle, W. Demisse, L. Rice, K. Klein, and P. Tyagi, "Alternating chempolishing and electropolishing for interior and exterior surface finishing of additively manufactured (AM) metal components," The International Journal of Advanced Manufacturing Technology, vol. 121, pp. 8159-8170, 2022/08/01 2022.
23. C. S. Taylor, M. Savadkoohi, P. Tyagi, J. E. Shoup, D. A. Arena, J. A. Borchers, et al., "Sputter Gas Damage in Nanolayered Pt/Co/Ir-based Synthetic Antiferromagnets for Top-Pinned Magnetic Tunnel Junctions," ACS Applied Nano Materials, vol. 6, pp. 131-139, 2023/01/13 2023.
24. E. Mutunga, C. D'Angelo, A. Grizzle, V. Lamberti, and P. Tyagi, "Dramatic effect of electrode type on tunnel junction based molecular spintronic devices," Organic Electronics, vol. 106, p. 106526, 2022/07/01/ 2022.
25. B. R. Dahal, A. Grizzle, C. D'Angelo, V. Lamberti, and P. Tyagi, "Competing Easy-Axis Anisotropies Impacting Magnetic Tunnel Junction-Based Molecular Spintronics Devices (MTJMSDs)," International Journal of Molecular Sciences, vol. 23, p. 14476, 2022.
26. B. R. Dahal, M. Savadkoohi, A. Grizzle, C. D'Angelo, V. Lamberti, and P. Tyagi, "Easy axis anisotropy creating high contrast magnetic zones on magnetic tunnel junctions based molecular spintronics devices (MTJMSD)," Scientific reports, vol. 12, pp. 1-14, 2022.
27. M. Savadkoohi, C. D'Angelo, A. Grizzle, B. Dahal, and P. Tyagi, "Spatial influence of paramagnetic molecules on magnetic tunnel junction-based molecular spintronic devices (MTJMSD)," Chemical Physics Letters, vol. 800, p. 139667, 2022/08/01/ 2022.
28. *M. Savadkoohi, C. D'Angelo, A. Grizzle, B. Dahal, and P. Tyagi, "Impact of ferromagnetic electrode length and thickness on Magnetic Tunnel Junction-Based Molecular Spintronic Devices (MTJMSD)," Organic Electronics, p. 106429, 2022.*
29. P. Tyagi, H. Brown, A. Grizzle, C. D'Angelo, and B. R. Dahal, "Molecular coupling competing with defects within insulator of the magnetic tunnel junction-based molecular spintronics devices," Scientific Reports, vol. 11, pp. 1-13, 2021.
30. M. Savadkoohi, B. R. Dahal, A. Grizzle, C. D'Angelo, and P. Tyagi, "Interaction between magnetic molecules and two ferromagnetic electrodes of a magnetic tunnel junction (MTJ)," Journal of Magnetism and Magnetic Materials, vol. 529, p. 167902, 2021.
31. A. Grizzle, C. D'Angelo, J. Martínez-Lillo, and P. Tyagi, "Spin state of a single-molecule magnet (SMM) creating long-range ordering on ferromagnetic layers of a magnetic tunnel junction – a Monte Carlo study," RSC Advances, vol. 11, pp. 32275-32285, 2021.

32. A. Grizzle, C. D'Angelo, and P. Tyagi, "Monte Carlo simulation to study the effect of molecular spin state on the spatio-temporal evolution of equilibrium magnetic properties of magnetic tunnel junction based molecular spintronics devices," AIP Advances, vol. 11, p. 015340, 2021.
33. H. Brown, A. Grizzle, C. D'Angelo, B. R. Dahal, and P. Tyagi, "Impact of direct exchange coupling via the insulator on the magnetic tunnel junction based molecular spintronics devices with competing molecule induced inter-electrode coupling," AIP Advances, vol. 11, p. 015228, 2021.
34. P. Tyagi, C. Riso, C. Rojas-Dotti, and F.Jose "SMM based Molecular Spintronics Devices" RSC Advances, Vol.10, 1306, 2020
35. 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
36. P. Tyagi and C. Riso, Molecular spintronics devices exhibiting properties of a solar cell. Nanotechnology 2019, 30 (49), 495401.
37. P. Tyagi and C. Riso, Magnetic force microscopy revealing long range molecule impact on magnetic tunnel junction based molecular spintronics devices. Organic Electronics 2019, 75, 105421.
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39. 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.
40. 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.
41. P. Tyagi and T. Goulet, "Nanoscale Tantalum Layer Impacting Magnetic Properties Of Tunnel Junction-Based Molecular Devices," MRS Comm., pp. 1-5, 2018.
42. 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.
43. P. Tyagi, "Surface Passivation with Sulfide and Fluoride Ions," MRS Advances, vol. 2, pp. 2915-2920, 2017.
44. 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.
45. 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.
46. E. Mutunga and P. Tyagi, "Patternable Rough Textured Gold Microwire for Neurochemical Sensing," MRS Advances, vol. 1, pp. 717-721, 2016.
47. 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.
48. P. Tyagi, E. Friebe, and C. Baker, "Advantages of Prefabricated Tunnel Junction Based Molecular Spintronics Devices," NANO, vol. 10, p. 1530002, 2015 2015.
49. 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.
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52. 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.

53. P. Tyagi, “Molecule Induced Strong Coupling between Ferromagnetic Electrodes of a Molecular Spintronics Device “ Mater. Sci. Forum, vol. 736, pp. 32-54, 2013.
54. 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.
55. P. Tyagi, “Fabrication of Tunnel Junction based Molecular Electronics and Spintronics Devices “ J. Nanoparticle Res., vol. 14, p. 1195, 2012.
56. P. Tyagi, “Multilayer Edge Molecular Electronics Devices: A Review,” J. Mater. Chem., vol. 21, pp. 4733-4742, 2011.
57. P. Tyagi, “Ultrathin Taox Based Photovoltaic Device,” Thin Solid Films, vol. 519, p. 2355, 2011.
58. 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.
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61. 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.
62. 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.
63. 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.
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65. P. Tyagi, “Molecular Spin Devices: Current Understanding and New Territories,” Nano, vol. 4, pp. 325-338 2009.
66. 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.

Submitted

67. Marzieh Savadkoohi, Rojas Dotti, Dan Gopman, Pawan Tyagi, Single molecule magnet spin channels on magnetic tunnel junction edges yielding 10K Percent Tunneling Magneto Resistance (Submitted)
68. Babu Sankhi and Pawan Tyagi (2025) C20 Alkane Spin Channels on Microscopic Magnetic Tunnel Junction Edge Producing Long Range Ordering and Room Temperature Current Suppression (Submitted)
69. Babu Sankhi and Pawan Tyagi (2025) 1000 Fold Magnetoresistance at Room Temperature on Molecular Spintronics Device Comprising C20 Alkane Spin Channels on Magnetic Tunnel Junction Edge (Submitted)
70. Erwan Peigney, Babu Sankhi, and Pawan Tyagi- Balistic Transport Via the Covalently bonded 1nm long C10 Spin channels on the Edge of Trenched Bottom Electrode and 3 nm Tunnel Barrier based Magnetic Tunnel Junction (Submitted)
71. Erwan Peigney, Babu Sankhi, and Pawan Tyagi- Exploring Gate-Controlled 3-Terminal Magnetic Tunnel Junction-Based Molecular Spintronic Devices (MTJMSD) Dynamics Through Monte Carlo Simulations (Submitted)
72. O. Kirkland, Hayden Brown, and Pawan Tyagi-Electron Spin Resonance Study the Effect of 2 Angstrom Variation in Insulator Thickness on Evolution of Acoustic and Optical Modes of Magnetic Tunnel Junction (Submitted)
73. Hayden Brown and Pawan Tyagi (2025) ESR Study of Thermal Stability of 2nm Alumina Tunnel Barrier in a Magnetic Tunnel Junction (Submitted)
74. Hayden Brown and Pawan Tyagi (2025) ESR Study of Shift in Acoustic and Optical Modes of Magnetic Tunnel Junction Due to Different Molecule Exchange Couplers (Submitted)
75. Pablo Edilberto Sanchez Guerrero, Pawan Tyagi *, Andrew Grizzle, Juan Estevez Hernandez, Daniel Fulford III, Lucas Rice, Surface Optimization of Additively Manufactured Stainless Steel Components Using Combined Chemical and Electrochemical Post-Processing (Submitted).

76. Wondwosen Demisse and Pawan Tyagi (2025), Optimization of Microstructure and Electrical Properties of Composites produced by Powder-based Electrochemical Metal Additive Manufacturing (Submitted)
77. Pius Suh and Pawan Tyagi, Metal Insulator Semiconductor and Single Molecule Magnet-based Molecular Devices (Submitted)
78. Pius Suh and Pawan Tyagi Volatile Organic Chemical Sensing with 2 nm Thin Alumina Tunnel Barrier and 3 nm Single Molecule Magnet (Submitted)
79. Ali Alshweiki, Tiwaloluwa Olukeye, Sambha Gaye, Wondwosen Demisse, and Pawan Tyagi* Design of Heat Exchanger with Internal Features for Vacuum 2 Tube based Solar Thermal Air Heater (Submitted)
80. Andoniaina Mariah Randriambololona, Hayden Brown, Christopher D'Angelo, Pawan Tyagi Competing Effect of Biquadratic and Heisenberg Coupling on Magnetic Tunnel Junction Molecular Spintronics Devices (Submitted)

Patent (4 awarded 7 Pending-4 Institutionally Approved -Inprogess):

1. ***P.Tyagi and Wondwosen Demisse, SCRATCH TESTER FOR ADHESION TESTING OF COATINGS ON SURFACES, Application Number, 17/838,502, Publication date 02.04.2025***
2. ***P. Tyagi and D. Shetty, "PUMPLESS SOLAR ENERGY BASED AIR HEATER AND METHOD(US Patent 10,775,058)," USA Patent. 2020.***
3. ***P. Tyagi, "Trenched Bottom Electrode and Liftoff based Molecular Devices. U.S. Patent Application No. 16/102,732.," 10833162, Nov 10, 2020,***
4. ***P. Tyagi, "Systems and Methods of Fabricating Gate Electrode on Trenched Bottom Electrode based Molecular Spintronics Device. ," USA Patent US20210111274A1, 4/4/2023, 2023.***
5. P. Tyagi, "Systems and Methods of Fabricating Gate Electrode on Trenched Bottom Electrode based Molecular Spintronics Device. ," WO/2022/066263, PCT/US2021/040607, Filing date 07.07.2021, Publication date 31.03.2022,
6. Pawan Tyagi, A system and method for fabricating trenched bottom electrode and molecular spintronics device-based electron spin dependent solar cell, 02/14/2023, Application # 17/033,552.(Pending)
7. Pawan Tyagi and Christopher D'Angelo, SYSTEM, METHOD, AND PROGRAM PRODUCT FOR SIMULATING SPATIAL AND TEMPORAL MAGNETIC PROPERTIES OF CONFIGURABLE MOLECULAR SPINTRONICS DEVICES, Application # 17722145. 04/15/2022(Pending)
8. Pawan Tyagi, SOLUTION BASED METAL ADDITIVE MANUFACTURING METHOD AND NOZZLE DESIGN FOR DELIVERY AND BONDING OF MICROSCOPIC PARTICLES, Application # 17380949. (Pending)
9. Pawan Tyagi, MAGNETIC TUNNEL JUNCTION BASED MOLECULAR SPINTRONICS DEVICE AND MAGNETIC RESONANCE SENSORS, patent pending, Application Number 17/742,775, filed on May 12, 2022(Pending)
10. Pawan Tyagi, Wondwosen Demisse, Apparatus and Method for Wet Powder Dispensing for Low Temperature Metal 3D Printing, Application# 18203333, 30 May, 2023 (Pending)
11. Pawan Tyagi and Marzieh Savadkoohi, Method for Making Bottom Electrode for Tunnel Junctions Application# 18/496,557, 27 October, 2023 (Pending)
12. Pawan Tyagi, Method and Design of Realizing Molecule Quantum State Entanglement with Magnetic Tunnel Junctions and C-NOT Quantum Gate., 2025(UDC Approved, In preparation)
13. Pawan Tyagi, Method and Design of Catalysis Process by Connecting Molecules Covalently with the Metallic Electrodes of an Array of Tunnel Junction, 2025 (UDC Approved, In preparation)
14. Pawan Tyagi, Method and Design of making electrochemically deposited sub-mm interior metallic features inside the metallic pipes (UDC Approved, In preparation)

15. Pawan Tyagi, Method of creating molecular tunnel barriers for high reproducibility and stability of Josephson Junction for Superconducting Qubit applications (UDC Approved, In preparation).

Book and Book chapter:

1. **Beyond The 3D Print: Advanced Post-processing Techniques For Metal Additive Manufacturing"** *Tyagi, Pawan, 2025, Publisher, ISBN-13 979-8305655827, ASIN : B0DS5WCNPY, Publisher: Index Sciences, London,*
2. **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 (44):

1. Pablo E. Sanchez, Devdas Shetty, and Pawan Tyagi (2025), Exploring Electroless Nickel Plating Applications on Additively Manufactured Metal Components: As-Built, Chempolished (Cp), and Electropolished (Ep) Surfaces. (Accepted in ASME -IMECE juried conference proceedings)
2. Alshweiki, A., T. Olukeye, U. Udeochu, B. Bari and P. Tyagi (2024). Exploring Nickel-Based Layered Double Hydroxides (LDH) as an Alternative of Platinum for Fuel Cell Applications. ASME 2024 International Mechanical Engineering Congress and Exposition. https://doi.org/10.1115/IMECE2024-144590
3. Olukeye, T., A. Alshweiki, U. Udeochu, B. Bari and P. Tyagi (2024). Economical Catalyst for Fuel Cell Applications: Cobalt-Based Layered Double Hydroxides (LDHS). ASME 2024 International Mechanical Engineering Congress and Exposition. https://doi.org/10.1115/IMECE2024-146164
4. Peebles, A. and P. Tyagi (2024). Assessing Innovation and Commercialization of Faculty at a Historically Black College and University. ASME 2024 International Mechanical Engineering Congress and Exposition. https://doi.org/10.1115/IMECE2024-144208
5. Tyagi, P. and A. Alshweiki (2024). Chat GPT Inclusive Student Active Teaching for Engineering Education. ASME 2024 International Mechanical Engineering Congress and Exposition. https://doi.org/10.1115/IMECE2024-146093
6. Pawan Tyagi and Oshin Wilson, Analysis of past and present student's perceptions who received positive intelligence training via mech 500 research method and technical communication course from 2018-2022 at the university of the district of columbia, edulearn23 Proceedings, 2023, Pages: 59-64, ISBN: 978-84-09-52151-7, ISSN: 2340-1117, 2023 doi: https:// doi.org/10.21125/edulearn.2023.0039
7. S. Addo and Pawan Tyagi, Positive intelligence training to develop engineering students' potential to commercialize an innovation in a historically black college and university ICERI2023 Proceedings, 16th annual International Conference of Education, Research and Innovation, 2023, Pages: 1271-1277, ISBN: 978-84-09-55942-8, ISSN: 2340-1095 doi: https:// doi.org/10.21125/iceri.2023.0421
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International conference and Invited Presentations:

Invited Talks

- **P. Tyagi** (2023). *Tunnel Junction-Based Molecular Devices Are a Gateway to Sense Diverse Chemicals with High Sensitivity and Selectivity.* Chemical and Biomolecular Engineering Symposium, Old Dominion University, Norfolk, VA, July 29, 2023.
- **P. Tyagi** (2023). *Miracle on the Edge of Tunnel Junction-Based Molecular Spintronic Devices.* University of Barcelona, Barcelona, Spain, July 6, 2023.
- **P. Tyagi** (2023). *Professional Development Strategies to Unleash the Highest Faculty, Postdoctoral Scholars, and Graduate Students in the Non-R2 Institutional Environment.* NSF CREST Principal Investigator Meeting, Salt Lake City, UT, August 24–27, 2023.
- **P. Tyagi** (2019). *Innovations in Materials Education.* 10th North American Materials Education Symposium (NAMES 2019), August 9–11, 2019.
- **P. Tyagi** (2019). *Chempolishing-Based Internal Surface Improvement for Additively Manufactured Components and Complex Geometries.* Boeing–Navy Additive Manufacturing Workshop, Seattle, WA, July 16–18, 2019.
- **P. Tyagi** (2019). *Advances in Additive Manufacturing for Aerospace Applications.* NAVAIR Aerospace Division Meeting, Patuxent River, MD, April 11, 2019.
- **P. Tyagi** (2018). *Nanotechnology and Additive Manufacturing: Emerging Opportunities.* US–Korea Conference (UKC-2018), St. Thomas University, New York, NY, August 1–4, 2018.

Selected Conference Presentations

2025

- **P. Tyagi**. *Single Molecule Magnets (SMM) Transforming Magnetic Tunnel Junction into Light Responsive Spin Diode.* 67th Electronic Materials Conference (EMC 2025), Duke University, Durham, NC, June 25–27, 2025.
- **P. Tyagi**. *Optical Properties of Single-Molecule Magnet (SMM) Modified Magnetic Tunnel Junction (MTJ) at Room Temperature.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **E. Friebe, P. Tyagi.** *Fabrication and Applications of Gate-Controlled Molecular Devices Using Trenched Bottom Electrodes for Spintronics.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **E. Friebe, P. Tyagi.** *Advancing Molecular Spintronics: Bottom Electrode Trenching in Magnetic Tunnel Junctions for Enhanced Small Molecule Integration.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **C. D'Angelo, P. Tyagi.** *Simulating Electron Spin Resonance in MTJ Molecular Spintronic Devices Using a Modified Heisenberg Monte Carlo Approach.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **J. Rivera, B. Sankhi, P. Tyagi.** *Response of Simulated T-Shaped Magnetic Tunnel Junction-Based Molecular Spintronics Devices (MTJMSDs) to Changes in Standard Physical Properties.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.

- **B. Bari, P. Tyagi.** *Economical Catalyst for Fuel Cell Applications: Cobalt-Based Layered Double Hydroxides (Co-LDHs).* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **H. Brown, P. Tyagi.** *Magnetic Tunnel Junction-Based Molecular Spintronics Devices for Chemical Sensing.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **P. Suh, P. Tyagi.** *Investigation of Volatile Organic Compound (VOC) Interactions with AlOx Insulator in MIS Devices for Chemical Sensing.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **O. Kirkland, P. Tyagi.** *Monte Carlo Study of Exchange Coupling in Magnetic Tunnel Junction Molecular Spintronic Devices with Increasing Bottom Electrode Size.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **O. Kirkland, P. Tyagi.** *Electron Spin Resonance Study of Magnetic Tunnel Junction Pillar Arrays: Effects of Insulator Thickness.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **B. Sankhi, P. Tyagi.** *Dzyaloshinskii–Moriya Interaction Induced Magnetic Stripes on MTJMSDs with Antiferromagnetic Electrode.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **B. Sankhi, P. Tyagi.** *Impact of Single-Molecule Magnets on Magnetic Tunnel Junctions with Antiferromagnetic and Ferromagnetic Electrodes.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **P. Suh, P. Tyagi.** *Single-Molecule Magnets (SMM) Transport Channel Formation Along Exposed Sides of MIS Diodes.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **B. Bari, P. Tyagi.** *Synthesis and Electrochemical Performance of Cu and Ni Carbonate-Based Layered Double Hydroxides for Direct Methanol Fuel Cells.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **H. Brown, P. Tyagi.** *Electron Spin Resonance of Magnetic Tunnel Junctions and Isolated Thin Films.* 67th EMC, Duke University, Durham, NC, June 25–27, 2025.
- **E. Peigney, H. Brown, B. Sankhi, P. Tyagi.** *Enhancing MTJMSDs Through Bottom Electrode Trenching for Small Molecule Attachment.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **C. D'Angelo, P. Tyagi.** *Impact of Number of Paramagnetic Nanostructures Coupled with Ferromagnetic Electrodes of Cross-Junction Shaped Molecular Spintronics Devices.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **B. Sankhi, P. Tyagi.** *Challenges of Using FeMn for MTJMSDs.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **H. Brown, E. Mutunga, P. Tyagi.** *Focused Ion Beam Milling of Ta/Co/NiFe Magnetic Tunnel Junction-Based Molecular Spintronics Devices.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **J.E. Hernandez, P. Tyagi, B.N. Mengesha, A. Feutmba.** *Understanding Stability and Behavior of MTJs Using Electron Spin Resonance.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **J.E. Hernandez, P. Tyagi, H. Brown, B. Sankhi.** *Correlation Between Top Electrode Size and Spin Orientations in T-Shaped MTJMSDs.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **B. Sankhi, P. Tyagi.** *Study of Dzyaloshinskii–Moriya Interaction on MTJMSDs.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **E. Peigney, H. Brown, B. Sankhi, P. Tyagi.** *Innovative Trenched Bottom Electrode Molecular Devices with Gate Electrodes.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **P. Tyagi.** *Magnetic Force Microscopy Revealing Long-Range Molecule-Bridge Induced Magnetic Ordering on MTJs.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.

- **P. Tyagi, C. Riso.** *Magnetic Tunnel Junction Testbed-Based Molecular Spintronics Devices: A Method of Solving a 70-Year-Old Challenge.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **B. Sankhi, P. Tyagi.** *Single Molecule Magnet Effects on Antiferromagnet-Based MTJs.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **J.E. Hernandez, J. Martinez-Lillo, P. Tyagi.** *Anomalous Optical Properties of SMM-Modified MTJs at Room Temperature.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **H. Brown, P. Tyagi.** *Organic Solvent Chemical Sensing with Various MTJMSD Configurations.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **O. Kirkland, P. Tyagi.** *Investigation and Design of MTJMSD-Based Solar Cells via Monte Carlo Simulation.* Joint MMM-Intermag 2025, New Orleans, LA, January 13–17, 2025.
- **P.E. Sanchez, D. Shetty, P. Tyagi** (2025). *Exploring Electroless Nickel Plating Applications on Additively Manufactured Metal Components: As-Built, Chempolished (Cp), and Electropolished (Ep) Surfaces.* ASME-IMECE 2025, Houston, TX.

2024

- **A. Alshweiki, T. Olukeye, U. Udeochu, B. Bari, P. Tyagi.** *Exploring Nickel-Based Layered Double Hydroxides (LDH) as an Alternative of Platinum for Fuel Cell Applications.* ASME-IMECE 2024, Portland, OR.
- **T. Olukeye, A. Alshweiki, U. Udeochu, B. Bari, P. Tyagi.** *Economical Catalyst for Fuel Cell Applications: Cobalt-Based Layered Double Hydroxides (LDHs).* ASME-IMECE 2024, Portland, OR.
- **A. Peebles, P. Tyagi.** *Assessing Innovation and Commercialization of Faculty at a Historically Black College and University.* ASME-IMECE 2024, Portland, OR.
- **P. Tyagi, A. Alshweiki.** *Chat GPT Inclusive Student Active Teaching for Engineering Education.* ASME-IMECE 2024, Portland, OR.
- **P. Suh, P. Tyagi.** *Development and Characterization of a Tunnel Junction Chemical Sensing (TJCS) Device for Neurochemical Detection with a Focus on Dopamine Sensing.* 66th Electronic Materials Conference (EMC 2024), University of Maryland, College Park, MD, June 2024.
- **P. Tyagi.** *Magnetic Tunnel Junction Testbed–Based Molecular Spintronics Devices: A Method of Solving a 70-Year-Old Challenge in Making Molecular Devices.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **C. D'Angelo, P. Tyagi.** *A Practical Simulation and Modeling Solution for Complex Magnetic Molecule and MTJ-Based Molecular Spintronics Devices: A Monte Carlo Method.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **H. Brown, E. Mutunga, P. Tyagi.** *Focused Ion Beam Milling of Ta/Co/NiFe Magnetic Tunnel Junction–Based Molecular Spintronics Device.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **A. Grizzle, C. D'Angelo, P. Tyagi.** *Evaluation of Machine Learning Models for Monte Carlo Simulation Study of MTJMSDs.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **P. Suh, P. Tyagi.** *Photovoltaic Effect on Silicon–Alumina–Ferromagnet Tunnel Junction Providing Insights About Spin-Dependent Molecular Spintronics Solar Cells.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **B. Bari, U. Udeochu, P. Tyagi.** *Synthesis of 5,10,15,20-Tetrasulphonatophenyl Porphyrin Molecular Channels for Harnessing MTJ-Based Molecular Spintronic Devices for Fuel Cell Applications.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.

- **C. D'Angelo, P. Tyagi, R. Juliano, A. Russell, C. Alexander, A. Grizzle.** *GUI and Data Visualization for Monte Carlo–Based Simulation of Molecular Tunnel Junction Spintronics Devices.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **B. Mengesha, A. Grizzle, W. Demisse, K. Klein, A. Elliott, P. Tyagi.** *Machine Learning–Enabled Quantitative Analysis of Optically Obscure Scratches on Nickel-Plated AM Samples.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **A. Grizzle, A. Elliott, P. Sanchez, P. Tyagi.** *Resolving Complex Surface Engineering Challenges by Taguchi Optimization of Electroless Nickel Coating Parameters on AM Binder-Jetted Composites.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **P. Tyagi, M. Savadkoohi, P. Suh, D. Gopman, F.J. Martinez.** *Spin Solar Cell Phenomenon on SMM-Impacted CoFeB-Based MTJs.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.
- **U. Amir, P. Tyagi, C. D'Angelo.** *Effect of Ferromagnetic Electrode Dimensions on Magnetic Properties of MTJ-Based Molecular Spintronics Devices.* 66th EMC 2024, University of Maryland, College Park, MD, June 2024.

2023

- **W. Demisse, B. Mengesha, L. Rice, P. Tyagi.** *Enhancing Surface Finishing of AM Metal Components Through Electroless Nickel Plating and ML-Assisted Instance Segmentation.* ASME-IMECE 2023, New Orleans, LA.
- **B.N. Mengesha, J. Estevez Hernandez, A. Feutmba, P. Tyagi.** *Energy Sensors and Absorbers Based on Nanoscale Magnetic Tunnel Junction Metamaterials.* ASME-IMECE 2023, New Orleans, LA.
- **P. Sanchez, P. Tyagi.** *Electropolishing (EP), Chempolishing (CP), and As-Built AM Metal Components for Electroless Nickel Plating Research.* ASME-IMECE 2023, New Orleans, LA.
- **T. Olukeye, S. Gaye, A. Alshweiki, P. Tyagi.** *Numerical Investigation of Turbulators in an Evacuated Tube Solar Collector Air Heat Exchanger.* ASME-IMECE 2023, New Orleans, LA.
- **A. Alshweiki, T. Olukeye, W. Demisse, P. Tyagi.** *Renewable Convective Heating by Metallic Strips Heated via a Solar Vacuum Tube.* ASME-IMECE 2023, New Orleans, LA.
- **P. Tyagi, M. Savadkoohi, C. Riso, E. Friebe.** *Single Molecule Magnet and MTJ-Based Molecular Spintronics Devices: Harnessing Exotic Properties of Molecular Nanostructure.* APS March Meeting 2023, Las Vegas, NV.
- **P. Tyagi, H. Brown, A. Grizzle, C. D'Angelo, B.R. Dahal.** *Defects Within Insulator of MTJ-Based Molecular Spintronics Devices Competing with Molecular Coupling.* APS March Meeting 2023, Las Vegas, NV.
- **B.R. Dahal, A. Grizzle, C. D'Angelo, V. Lamberti, P. Tyagi.** *Competing Easy Axis Anisotropies Impacting MTJMSDs.* APS March Meeting 2023, Las Vegas, NV.
- **P. Tyagi, C. D'Angelo.** *A Monte Carlo Study of Paramagnetic Nanostructure Coupled with Two Ferromagnetic Electrodes of a Cross-Junction Spintronics Device at Different Thermal Energies.* APS March Meeting 2023, Las Vegas, NV.
- **P. Tyagi, O. Wilson.** *Analysis of Student Perceptions Following Positive Intelligence Training via MECH 500 (2018–2022).* EDULEARN23, Palma de Mallorca, Spain, July 3–5, 2023.
- **S. Addo, P. Tyagi.** *Positive Intelligence Training to Develop Engineering Students' Potential to Commercialize Innovation at an HBCU.* EDULEARN23, Palma de Mallorca, Spain, July 3–5, 2023.
- **P. Tyagi.** *Positive Intelligence Education for Enhancing Learning Skills of College Students.* EDULEARN23, Palma de Mallorca, Spain, July 3–5, 2023.

2022

- **P. Tyagi.** *Transactional Analysis Training for Improving Engineering Graduate Students' Abilities to Understand Different Personalities.* ASME-IMECE 2022, Columbus, OH.
- **S. Addo, P. Tyagi, E. Mutunga.** *Assessing Undergraduate Awareness of Commercialization of Engineering Research Innovation at an HBCU.* ASME-IMECE 2022, Columbus, OH.
- **S. Addo, P. Tyagi, S. Gaye, K. Baker.** *Promoting Globalization of Engineering via Transactional Analysis at an HBCU.* ASME-IMECE 2022, Columbus, OH.
- **P. Sanchez, Z. Waqar, P. Tyagi.** *Application of Nickel Deposition on EP, CP, and As-Built AM Metal Components.* ASME-IMECE 2022, Columbus, OH.

2021

- **H. Dang, P. Tyagi, E. Ososanya, K. Klein.** *Project-Based Course Enabled Nanotechnology Education for Senior/Graduate Students.* ASME-IMECE 2021, Virtual (originally Anaheim, CA).
- **B. Ndoye, N. Ouedraogo, W. Demisse, A. Grizzle, E. Mutunga, P. Tyagi.** *3D-Printed and Nickel-Coated Electrodes for Photocatalytic Electrolysis for Hydrogen Generation.* ASME-IMECE 2021, Virtual (originally Anaheim, CA).
- **S. Addo, P. Tyagi, D. Shetty.** *Educating HBCU Innovators About Commercialization via Customer Discovery.* ASME-IMECE 2021, Virtual (originally Anaheim, CA).
- **W. Demisse, E. Mutunga, K. Klein, L. Rice, P. Tyagi.** *Surface Finishing and Electroless Nickel Plating of AM Metal Components.* ASME-IMECE 2021, Virtual (originally Anaheim, CA).
- **Z. Waqar, B.R. Dahal, E. Mutunga, M. Savadkoohi, U. Amir, P. Suh, et al., P. Tyagi.** *Hysteresis Loop Studies of MTJ-Based Molecular Spintronics Devices via Monte Carlo Simulations.* IEEE NANO 2021.

2020

- **U. Dillard, U. Amir, P. Tyagi, V. Lamberti.** *Structural Stability of MTJMSDs.* ASME-IMECE 2020, Virtual (originally Portland, OR).
- **J. Dillard, A. Grizzle, W. Demisse, P. Tyagi, L. Rice, C. Benton.** *Effect of Altering Sequence of Chempolishing and Electropolishing on Surface Properties of AM 316 Steel.* ASME-IMECE 2020, Virtual (originally Portland, OR).
- **M. Scerbo, G. D'Orazio, P. Tyagi.** *Impacts on Head Loss in a Pumpless Solar Thermal Heater (Hardy-Cross Methodology).* ASME-IMECE 2020, Virtual (originally Portland, OR).
- **P. Tyagi.** *Second Modified SPET Method Tested in COVID-19 Affected Senior ME Course.* ASME-IMECE 2020, Virtual (originally Portland, OR).
- **P. Tyagi, W. Demisse, M. Savadkoohi, T. Gemeda.** *Positive Intelligence Training to Develop Self-Awareness for Enhancing Student Learning.* ASME-IMECE 2020, Virtual (originally Portland, OR).

2019-2013

- **P. Tyagi.** *Positive Intelligence Education for Enhancing Learning Skills of College Students.* ASME-IMECE 2019, Salt Lake City, UT.
- **P. Tyagi.** *Student Presentation-Based Teaching (SPET) Approach for Classes with Higher Enrollment.* ASME-IMECE 2018, Pittsburgh, PA.

- **P. Tyagi, J. Xu, L. Thompson, M. Thomas, C. Moore, S. Haghani, et al.** *Experience of Multiple Instructors About SPET Approach.* ASME-IMECE 2018, Pittsburgh, PA.

- **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-IMECE 2018, Pittsburgh, PA.
- **P. Tyagi, T. Goulet, D. Brent, K. Klein, F. Garcia-Moreno.** *SEM and Optical Profilometry of Electropolished AM 316 Steel Components.* ASME-IMECE 2018, Pittsburgh, PA.
- **P. Tyagi.** *Student Presentation-Based Effective Teaching (SPET) Approach for Advanced Courses.* ASME-IMECE 2016, Phoenix, AZ.

- **P. Tyagi.** *Easily Adoptable Interactive Teaching Practices and Student Progress Monitoring Strategies.* ASME-IMECE 2014, Montreal, Canada.
- **P. Tyagi, C. Baker, C. D'Angelo.** *Tunnel Junction Testbed Based Molecular Devices.* IEEE-NANO 2014.
- **P. Tyagi, C. Baker, C. D'Angelo.** *A Monte Carlo Study of Molecular Nanostructure-Based Spintronics Devices.* IEEE-NANO 2014.

- **P. Tyagi, C. Baker, C. D'Angelo.** *A Monte Carlo Study of Molecular Nanostructure-Based Spintronics Devices.* ASME-IMECE 2013, San Diego, CA.
- **P. Tyagi.** *Spin Photovoltaic Effect on Molecule-Coupled Ferromagnetic Films of a Magnetic Tunnel Junction.* ASME-IMECE 2013, San Diego, CA.
- **C. D'Angelo, P. Tyagi.** *Molecular Magnet Induced Transformative Effects in Molecular Spintronics Devices: A Monte Carlo Study.* MRS (Fall) 2013.
- **P. Tyagi.** *Room Temperature Current Suppression on Magnetic Tunnel Junction-Based Molecular Spintronics Devices.* MRS (Fall) 2013.

Peer Reviewer and Editor:

- Associate editor International Journal of Energy Engineering (2014-present)
- Peer reviewer for ACS Nano, Advanced Materials, Additive Manufacturing, Dalton, Nanotechnology, Helion
- Portfolio evaluator for University of Michigan, Howard University, NRC _postdoc
- External grant reviewer of Irish Science Foundation, NSF.

Federal grants and research funding:

Support ~$20 Million federal funding at UDC

Funding	Federal grant	Role in the grant	Funding duration	
			Start	End
$350, 000	**NSF-CREST Annual Meeting Grant**	**Co-PI**	2024	2026
$320, 000	**NSF-CREST Postdoctoral Fellowship for molecular-scale memory devices**	**PI**	2025	2027
$320, 000	**NSF-CREST Postdoctoral Fellowship for Raman study of molecular devices**	**PI**	2024	2026

$100, 000	**NSF-CREST Supplemental grant for Collaboration development and repair at UDC**	**PI**	2024	2025
$4.9 M	**National Science Foundation-CREST, Center of Nanotechnology Research and Education**	**PI**	2019	2026
$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
$650	**NSF-Research Instrumentation Grant: FIB and Scanning Electron Microscope(SEM)**	**Co-PI**	2020	2021
$ 400	**NSF-Research Instrumentation Grant: X-Ray Diffractometer**	**Co-PI**	2021	2022
$5 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 Contract	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 21st Century Smart Grid Workforce.	Co-PI	2014	2017
$200,000	National Science Foundation –ATE grant: Nanotechnology Education and Workforce Development"	Co-PIl	2014	2016
$400,000	National Science Foundation Targeted Infusion proposal on: Course development for Renewable Energy Concentration	Senior personnel	2010	2013

Research Capacity Building:

Nano fabrication and measurement 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. Advancing as Pepco Energy laboratory with $2M funds

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.

Postdoctoral scholars

1. Dr. Pius Suh (2025-2027) NSF-CREST Postdoctoral Research Fellowship
2. Dr. Omari Kirkland (2024-2026) NSF-CREST Postdoctoral Research Fellowship
3. Dr. Bushra Bari (2023-2024) American Physical Society
4. Dr. Eva Mutunga (2021-2023)
5. Dr. Bishnu Dahal (2020-2022)
6. Dr. Babu Sankhi (2023-2025)
7. Dr. Erwan Peigney (2023-2025)

UDC Faculty Associate under NSF CREST Center Supported with laboratory & grant funding

1. Dr. Rong Zhao (Summer salary and supply to start AM and energy research)

2. Dr. Alexander Peebles (Summer salary and supply for promoting Innovation and commercialization training)
3. Dr. Uche Udeochu (Equipment upgrade, postdoc, two graduate students)
4. Dr. Xuexing Song (XRD Instrument-related supply)
5. Dr. Jiajun Xu (Purchase of equipment and repair of EOS M280)
6. Dr. Azam Hussain (~$100K for PhD students and undergraduates)
7. Dr. Ujjwal Patil (SEM for his PhD student)
8. Dr. Kate Klein (SEM laboratory function)
9. Dr. Hongmei Dang (Housing her group in the Nanotechnology lab and sharing resources)
10. Dr. Anil Kumar (UDC-Community college for BIOL 105 Intro to Nanotech)
11. Dr. Bushra Ahmed Saeed (UDC-Community college for BIOL 105 Intro to Nanotech)

Graduate Students

Doctoral Students Supervised by Dr. Pawan Tyagi

- **Marzieh Savadkoohi** (PhD, 2023) – *Magnetic Tunnel Junction–Based Molecular Spintronics Devices for Memory.*
- **Wondwosen Demisse** (PhD, 2024) – *Powder and Electrochemical-Based Metal Additive Manufacturing 3D Printer.*
- **Pius Suh** (PhD, 2024) – *Metal–Insulator–Semiconductor and Single-Molecule Magnet-Based Chemical Sensors.*
- **Andrew Grizzle** (anticipated PhD completion Fall 2025) – *Machine Learning–Enabled Atomistic Understanding of Molecular Spintronics Devices and Additively Manufactured Components.*
- **Hayden Brown** (anticipated PhD completion Summer 2026) – *Electron Spin Resonance Study of Molecular Spintronics Device–Based Chemical Sensors.*
- **Juan Estevez Hernandez** (anticipated PhD completion Summer 2026) – *Study of Spin Photovoltaic Effect on MTJMSDs.*
- **Sampson Addo** (anticipated PhD completion Summer 2026) – *Promoting Innovation and Intellectual Property Growth at Non-R2 Institutions.*
- **Christopher D'Angelo** (anticipated PhD completion Summer 2026) – *Monte Carlo Simulations for Understanding Molecular Spintronics Devices.*
- **Pablo Guerrero Sanchez** (anticipated PhD completion Summer 2026) – *Internal Feature Growth via 3D Printing Inside Pipes.*
- **Uzma Amir** (anticipated PhD completion Summer 2026) – *Transport Studies of Magnetic Tunnel Junction–Based Molecular Spintronics Devices.*

Other PhD Students Supported with NSF-CREST CNRE Funds

- **Samba Gaye** (Advisor: Denise Max)
- **Kaiya Baker** (Advisor: Jiajun Xu)
- **Steohaine Santos** (Advisor: Azam Hussain)
- **Rodney Trapp** (Advisor: CAUSES)
- **Julian King** (Advisor: CAUSES)
- **Patrick Adegbaye** (Advisor: Jiajun Xu)

MS Projects and Theses Supervised by Dr. Pawan Tyagi

- **Cameron Huey** (MS, 2025) – *Anisotropy Effect in Magnetic Electrodes.*
- **Hayden Brown** (MS, 2024) – *Defect Study in Magnetic Tunnel Junctions.*
- **Ali Alshweiki** (MS, 2024) – *Ni-Based Porphyrin for Electrocatalysis.*
- **Tiwa Olukeye** (MS, 2024) – *Molecular Catalysis for Fuel Cell Applications.*
- **Reid Muhammed** (MS, 2023) – *Finite Element Study of Head Loss in Heat Exchangers.*
- **Andrew Grizzle** (MS, 2023) – *Electroless Coating of Binder-Jetted 3D Prints.*
- **Wondwosen Demisse** (MS, 2023) – *Electroless Nickel Coating of Laser-Sintered Additively Manufactured Components.*
- **Pius Suh** (MS, 2023) – *Monte Carlo Simulations of Molecular Devices Under a Magnetic Field.*

Graduate Courses Taught:

1. MECH 500 Research Methods and Technical Communication
2. MECH 611 Special Topics-Magnetism and Spintronics
3. MECH-611 Nanoscale Devices
4. MECH 611 Monte Carlo Simulation Methods
5. MECH 611 Nanoscale material characterizations.
6. CCEN 701 PhD Thesis resaerch
7. CCEN 701 Colloquium
8. MECH 699 MS Thesis

Student Active Undergraduate Courses:

1. MECH 462/50X Design of Energy Syestem
2. MECH 302 Undergraduate Resaerch Experience Course
3. MECH 487 Photovoltaic and Solar Thermal Energy Syestem
4. MECH-488 Fuel Cell Science and Technology
5. MECH-107 Scientific Programming
6. MECH 494/495 Senior Capstone Project.
7. CVEN 100 Introduction to Engineering
8. IGED 270 Introduction to Renewable Energy

Department Curriculum Chair 2014-2020:

1. Started Renewable Energy concentration with NSF-TIP grant support
2. Started Advanced Manufacturing concentration with DOE-NNSA (2013-2019), Grants
3. Started MECH 302 Undergraduate Resaerch Experience Course.
4. Started Experiential Learning oriented MECH 107 CREO-based CAD Course (NNSA industry recommended)

5. Actively maintained the Industrial Advisory Board for mechanical engineering for 6 years.
6. Wrote the 2020 Continuous Improvement Chapter for the ABET report

Partnership with other institutions and industries:

1. Consortium of Advance Manufacturing: Since 2012-2022 I led and represented 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 Institute of Standards and Technology (NIST) – Dr. Daniel Gopman, Dr. Robert Shull, and Dr. Brian Kirby
   Naval Research Laboratory – Dr. Mark Johnson
   NAVAiR- Phan Nam

3. Active Research collaborations:
   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

Awards and Honors :

1. **University-Wide Scholar Award**, University of the District of Columbia, 2024
2. **University-Wide Excellence in Teaching Award**, University of the District of Columbia, 2022
3. **University-Wide Excellence in External Funding Award**, University of the District of Columbia, 2020
4. **National STEM Innovation Award**, BEYA STEM Conference, Washington, DC, 2020
5. **Dean's Research Excellence Award**, School of Engineering, University of the District of Columbia, 2012
6. **Dean's Research Excellence Award**, School of Engineering, University of the District of Columbia, 2013
7. **Dean's Research Excellence Award**, School of Engineering, University of the District of Columbia, 2014
8. **Dean's Research Excellence Award**, School of Engineering, University of the District of Columbia, 2015
9. **Dean's Research Leadership Excellence Award (DOE–NNSA Consortium)**, School of Engineering, University of the District of Columbia, 2020
10. **Dean's Research Leadership Excellence Award (NSF–CREST Center for Nanotechnology Research and Education)**, School of Engineering, University of the District of Columbia, 2020

UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

Fiscal Impact Statement

Memorandum

To: The Board of Trustees

From: Managing Director of Finance David A. Franklin

Date: June 16, 2025

Subject: Appointment as Distinguished Professor for Pawan Tyagi, Ph.D., School of Engineering and Applied Sciences

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Conclusion

It is concluded that there are sufficient unrestricted funds in the University's Academic Affairs budget to cover the cost of salary and benefits associated with the appointment of Dr. Pawan Tyagi to the rank of Distinguished Professor of Mechanical Engineering, School of Engineering and Applied Sciences (SEAS).

Background

The proposed resolution recommends the appointment of Pawan Tyagi, Ph.D., to Distinguished Professor in the Department of Mechanical Engineering, School of Engineering and Applied Sciences (SEAS). Dr. Tyagi's promotion is supported by the recommendation of the Dean of SEAS, Dr. Devdas Shetty, external reviewers, the Chief Academic Officer, and the President. All cite his more than 15 years at UDC and a distinguished career marked by exceptional achievements in research, teaching, and service, including recognition as a top 2% global scientist, sustained success in securing more than $20 million in external funding, leadership of the NSF-CREST Center for Nanotechnology Research and Education, and an extensive record of high-impact publications, patents, and student mentorship that has advanced UDC's research mission and national visibility.

Financial Impact

The proposed resolution includes a salary increase, adjusting Dr. Tyagi's salary from $116,133.53 to $127,746.88 within the Professor Pay Band B, as defined under the 9th Master Agreement. With the addition of $35,769.13 in anticipated fringe benefits (28%), the adjusted compensation rate equals $163,516.01. The fiscal impact of the increase is projected at $14,865.09.

There are no anticipated risks at this time.