

Sharmila M. Mukhopadhyay

Director, Frontier Institute of Research in Sensor Technologies (FIRST)

Professor of Mechanical Engineering

Fellow, American Ceramic Society

Past Jefferson Science Fellow, National Academies of Science, Engineering and Medicine

<https://umaine.edu/first/people/sharmila-m-mukhopadhyay/>

http://sites.nationalacademies.org/PGA/Jefferson/PGA_169847

PROFESSIONAL EXPERIENCE

2020- present	Director, Frontier Institute of Research in Sensor Technologies, Professor of Mechanical Engineering, University of Maine, Orono, ME.
2020- present	Emeritus Professor, Mechanical & Materials Engineering, Wright State University (WSU), Dayton, OH
2002-2019	Professor, Mechanical & Materials Engineering, Wright State University.
2016-2017	Jefferson Science Fellow, National Academies and US Department of State
2018-2019	Founding Director, National Academies-Grand Challenges Scholars Program, Wright State University (WSU)
2008- 2019	Founding Director, Center for Nanoscale Multifunctional Materials (WSU)
2017-2019	MS Program Director, Materials Science & Engineering
1997- 2002	Asst & Asso. Prof. Mechanical & Materials Engineering, WSU
1990-1997	Metallurgy & Materials Science (program dissolved), Polytechnic University, Brooklyn, NY. (currently New York University)
1989 - 1990	Post- Doctoral Associate, Rutgers University, Piscataway, NJ
1983 - 1989	Graduate Research Assistant, Cornell University
Summers 2000-03	Summer Faculty Fellow, Air Force Research Laboratory
Summer, 1986	Consultant, Oak Ridge National Laboratory

EDUCATION

Ph.D.	Materials Science & Engineering Cornell University, Ithaca, NY, USA
M. S. / B.S.	Solid State Physics Indian Institute of Technology, Kharagpur, India

HONORS/ AWARDS

- Selected as Jefferson Science Fellow by The National Academies of Science, Engineering and Medicine, 2016.
- Elected Fellow, American Ceramic Society, 2007-

- Trustee’s Award of Faculty Excellence, the highest award given by Wright State University “to honor those who serve as the most outstanding of role models for all faculty”, 2011.
- Outstanding Faculty Member, 2011, Excellence in Research, College of Engineering and Computer Science, 2005.
- Featured in Marquis “Who’s Who in America”, “Who’s Who in Science and Engineering”, and Who’s Who in the World.
- Albert Nelson Marquis Lifetime Achievement Award, 2019
- Certificate for National Ranking (top 10) at the nationwide Indian School Certificate Examination.

SELECTED CAREER HIGHLIGHTS

The following sections provide my career highlights in different categories:

- I. Director, Frontier Institute for Research in Sensor Technologies (FIRST)
- II. Jefferson Science Fellow, National Academies to serve as Senior Scientific advisor to the US Department of State
- III. Founding Director, Center for Nanoscale Multi-functional Materials at WSU
- IV. Founding Director, Natl. Acad. of Engr-Grand Challenges Scholar’s Program at WSU
- V. Publications & Scholarship: From over 150 papers, book chapters, reports, and reviews.
- VI. Sample Invited Talks: Snapshot from the last seven years.
- VII. Research Grants and Contracts: Federal, State, Private Foundation, and Industry.
- VIII. Researcher Mentoring and Supervision.
- IX. Classroom teaching experience.
- X. Services to the profession.
- XI. Services to my earlier university.
- XII. Sample outreach and voluntary activities for the larger community
- XIII. Examples of media releases about my work

I. DIRECTOR, FRONTIER INSTITUTE FOR RESEARCH IN SENSOR TECHNOLOGIES (FIRST)

FIRST (formerly known as the Laboratory of Surface Science Technologies or LASST) is a multi-disciplinary research institute for innovative research and education in advanced materials and sensor systems related to societal grand challenges in energy, health, environment, and economic well-being. I joined as Director after LASST was reorganized to create FIRST, and am responsible for all aspects of planning, leading and execution of different functions of this Institute. Some highlights of my Director experience are the following:

1. Talent expansion in alignment with academic departments & colleges:

When I joined FIRST as Director in Jan 2020, there was an urgent need to add faculty members to reverse the shrinkage of the previous decade. Since then, we have added six new Joint and Associate faculty members from four different disciplines. Two more faculty will be added this year (interviews ongoing) and additional positions expected in the next few years.

2. Multi-faceted Research projects involving FIRST faculty:

The overall impact and footprint of FIRST has increased recently, partly due to broadening faculty participation from different backgrounds and expanded collaborations with other researchers across campus. For instance, in FY 2019, FIRST (LASST at that time) affiliated faculty were collectively participating in 13 projects having a total budget of \$8M. In FY 2023, FIRST Faculty were involved in 53 projects with a total budget of \$39M. Similarly, numbers of MS & PhD graduates mentored by FIRST faculty increased from 6 in FY 19 to 10 in FY 2023.

3. Establishment of Graduate Interdisciplinary Group and programs in Materials Science & Engineering:

In 2022, I was able to connect faculty from seven departments across three colleges (MCEC, COSM and ELH) to form an inter-disciplinary faculty group in Materials Science and Engineering. This helped fill an important gap in the entire state of Maine.

4. Development of new educational programs:

To date, the following programs have been developed: (i) **Interdisciplinary-PhD in Materials Science & Engineering:** This new concentration in Materials Science & Engineering was approved last year and has started enrolling students. (ii) **Professional Certificate with statewide partnership:** This certificate is meant to enable part-time professionals as well as students from other programs who can benefit from credentialing their Materials Expertise. The curriculum has been prepared and finalized and is under the formal approval process. (iii) **Workforce training through short courses and workshops:** Several short courses and workshops are under preparation, with the first workshop planned for Spring 2024.

5. Additional leadership and outreach activities for promoting FIRST:

- i. Periodic meetings (both in person and via Zoom) with Research Group Leaders at Federal Labs and industry, as well as Program Directors at Federal agencies to keep track of emerging collaborative areas.
- ii. Developed non-disclosure agreements and proposals with a Maine-based environmental company and a Federal laboratory, and currently in the process of negotiating stronger ties for technology transfer.
- iii. Regular communications with Portland Gateway and University of Southern Maine to develop collaborative projects and educational initiatives.

- iv. President's Facilities Management Task Force to address the infrastructure challenges at FIRST.
- v. Periodic one-on-one meetings with the newly appointed FIRST faculty, in addition to as-needed discussion sessions and regular faculty/staff meetings.
- vi. Active participation in NSF proposal reviews: I have participated in multiple panels for EPSCOR Track 1 (Budget \$20M), Advanced Manufacturing, and am also providing ad-hoc mail reviews in collaborative proposals related to their new thematic areas.
- vii. Webinars and panels: This includes Women in Biomaterials panel of the American Ceramic Society and Catalyst panel for 4th Global Summit on Catalysis and Chemical Engineering.
- viii. Podcast by the Office of the Science and Technology Advisor to the Secretary of State (STAS) to highlight the power of S&T at the State Department.
- ix. Guest Editor of special volume- Special Issue of Nanomaterials (Impact Factor 5.7): "Multifunctional Nanomaterials and Hybrid Structures for Sensors, Actuators and Smart Technologies"
- x. Developed the core course sequence for the new PhD program and Professional Certificate introduced at UMaine.
- xi. Presented two keynote lectures, one plenary talk and six invited talks between 2021-2023.
- xii. External Evaluator for Full Professor promotion - External University
- xiii. Book Review for CRC Press – "Influencing Our Planet: Re-engineering our actions through Systems Engineering."
- xiv. Member of University Research Council, UMaine
- xv. Served on MEIF priorities committee, UMaine
- xvi. Served as Chair of Center Director Search Committee
- xvii. Member of Center Director Peer Review Committees
- xviii. Search Committee for VP Financial Analyst -UMaine
- xix. Selection Committees for Chaired Professors at UMaine
- xx. Steering Committee member of Maine AI Initiative
- xxi. Steering Committee member of Maine PFAS+ Initiative
- xxii. Bodwell Distinguished Professorship Selection Committee, ECE Department
- xxiii. Chair- MEE-GEM cluster hire search Committee
- xxiv. Review panel for UMaine internal grants
- xxv. Search Committee - Assistant Vice President of Research
- xxvi. Hosted site visits for prospective external collaborators
- xxvii. Research Advancement and Advisory Committee of MEE Department
- xxviii. Host undergrad and precollege students for CUGR, NSF-REU, and Maine Space Grant programs.
- xxix. Member, Green Energy Materials (GEM) Pedagogy PIT group
- xxx. Regular review for scientific journals such as IEE Sensors, Carbon etc.

II. JEFFERSON SCIENCE FELLOW: NATIONAL ACADEMIES

Website: http://sites.nationalacademies.org/PGA/Jefferson/PGA_169847

This fellowship by the National Academies of Science, Engineering and Medicine is offered to 10-15 tenured faculty members across the country after a nationwide competition. Therefore, receiving a Jefferson Science Fellowship (JSF) is considered a significant honor, both for the individual and for their academic institution. It is designed to engage the academic communities in the formulation and implementation of U.S. foreign policy.

My JSF assignment was with the Bureau of Economic and Business Affairs at the US Department of state, where I was able to leverage my expertise and network to create linkages between cutting-edge technical innovations and governmental entities focused on economic development. I was involved in facilitating US engagement with international academics and governmental personnel to support high-tech innovation and entrepreneurship hubs within bilateral/multilateral regulatory framework. This included working with multiagency working groups within the US Government such as the NSET subcommittee of the National Nanotechnology Initiative (NNI), the Emerging Materials and Manufacturing Sciences (EMMS) working group of the India-US S&T Agreement, and the S&T Joint Committee of Korea-US (KORUS) agreement.

III. FOUNDING DIRECTOR: CENTER FOR NANOSCALE MULTIFUNCTIONAL MATERIALS AT PRIOR UNIVERSITY

The Center was created in 2008 from facilities procured by funding from NSF, Ohio Board of Regents and DOD. It served as a focal point for science and engineering research and education in the expanding field of nano-technology, and fostered multidisciplinary efforts of university faculty with industrial and federal researchers. Partnering institutions included several for-profit companies, Air Force Research Laboratory, the Environmental Protection Agency, and multiple universities with funded collaborative projects. Major Facilities included X-Ray Photoelectron Spectroscopy (AXIS Ultra), Field Emission Scanning Electron Microscopy (FE-SEM), several Plasma Processing and Chemical Vapor Deposition capabilities, as well as custom-designed reactors and property testing platforms.

IV. FOUNDING DIRECTOR: NATIONAL ACADEMY OF ENGINEERING-GRAND CHALLENGES SCHOLAR'S PROGRAM AT WRIGHT STATE

<http://webapp2.wright.edu/web1/newsroom/2018/12/11/grand-challenges/>

I worked closely with the National Academy of Engineering (NAE) to get the GCSP program at WSU approved by NAE in November 2018. The National Academy of Engineering - Grand

Challenges Scholars Program (GCSP) involves strengthening five competency areas in addition to classroom teaching: (i) research and creativity (ii) multidisciplinary thinking, (iii) viable business and entrepreneurship skills, (iv) multi-cultural understanding, and (v) social consciousness. Given the fiscal constraints within the university, this program was developed with minimal resources, by combining the existing strengths within different colleges in the university and bridging them with shared infrastructure and expertise.

V. SCHOLARLY PUBLICATIONS AND RESEARCH PRODUCTS
(Partial list from over 150 archival papers, books, reviews, and patents)

1. Wenhui Wang, Dignesh Thesiya and Sharmila M. Mukhopadhyay, Hierarchical hybrid heat sink material for thermo-electric generators, Applied Thermal Engineering, Elsevier, 236, 2024, 121674. <https://doi.org/10.1016/j.applthermaleng.2023.121674>
2. Parikh, S.D.; Wang, W.; Nelson, M.T.; Sulentic, C.E.W.; Mukhopadhyay, S.M. Bioinspired Hierarchical Carbon Structures as Potential Scaffolds for Wound Healing and Tissue Regeneration Applications. Nanomaterials 2023, 13, 1791. <https://doi.org/10.3390/nano13111791>
3. Wang, W.; Nadagouda, M.N.; Mukhopadhyay, S.M., Advances in Matrix-Supported Palladium Nanocatalysts for Water Treatment, , Nanomaterials 2022, 12, 3593. <https://doi.org/10.3390/nano12203593>
4. Wenhui Wang, S.M. Mukhopadhyay, Hierarchical nanostructured surface design for robust and flexible multifunctional devices, Carbon Trends, Volume 5, 2021, 100096, ISSN 2667-0569, <https://doi.org/10.1016/j.cartre.2021.100096> .
5. Wenhui Wang, M.N. Nadagouda, S.M. Mukhopadhyay, “Flexible Reusable Hierarchical Hybrid Catalyst for Rapid and Complete Degradation of Triclosan in Water”, Science of the Total Environment, 766 (2021) 144109. <https://doi.org/10.1016/j.scitotenv.2020.144109>
6. Sharmila M. Mukhopadhyay, “Hierarchical Hybrid Nanomaterial Heat Sinks” Invention filed by UMaine on March 14, 2023. USPTO Application Number: 63452013.
7. Sharmila M. Mukhopadhyay, “Reusable Nanomaterials for Mitigation of Persistent Organic Pollutants”, Invention filed by UMaine on Nov 17, 2023, USPTO application # 63/600494.
8. Soham D Parikh, Soham Dave. Luping Huang, Wenhui Wang, Sharmila M Mukhopadhyay, Debra A Mayes, “Multi-walled carbon nanotube carpets as scaffolds for u87Glioblastoma multiforma cell growth”, Materials Science & Engineering C, Volume 108, March 2020 <https://www.sciencedirect.com/science/article/abs/pii/S0928493119319897>
9. H. Vijwani, M.N. Nadagouda, S.M. Mukhopadhyay, “Robust nanocatalyst membranes for degradation of atrazine in water”, Journal of Water Process Engineering, Volume 25, October 2018, Pages 15-21
10. Betty T. Quinton, Levi Elston, James D. Scofield and Sharmila M. Mukhopadhyay, “Aligned Carbon Nanotube Arrays Bonded to Solid Graphite Substrates: Thermal Analysis for Future

- Device Cooling Applications”, *Journal of Carbon Research*, 2018, 4, 28; doi:10.3390/c4020028.
11. LvMeng He, Anil Karumuri and Sharmila M. Mukhopadhyay, “Wettability Tailoring of Nanotube Carpets: Morphology-Chemistry Synergy for Hydrophobic-Hydrophilic Cycling”, *RSC Advances* 7(41):25267, May 2017.
 12. Akhil Patel, Shilpa Mukundan, Wenhui Wang, Anil Karumuri, Vinayak Sant, Sharmila M. Mukhopadhyay, Shilpa Sant, Carbon-based hierarchical scaffolds for myoblast differentiation: Synergy between nano-functionalization and alignment, *Acta Biomater.* 2016, Mar 1.
 13. Rajaram Narayanan, Hema Vijwani, Sharmila M. Mukhopadhyay, Prabhakar R. Bandaru, “Electrochemical charge storage in hierarchical carbon manifolds”, *Carbon*, Volume 99, April 2016, Pages 267–271.
 14. Anil K. Karumuri, Dhawal P. Oswal, Heather A. Hostetler and Sharmila M. Mukhopadhyay, “Silver nanoparticles supported on carbon nanotube carpets: Influence of surface functionalization”, *Nanotechnology*, Apr 8, 27(14), 2016.
 15. Kshitij C. Jha, Zhuonan Liu, Hema Vijwani, Mallikarjuna Nadagouda, Sharmila M. Mukhopadhyay, and Mesfin Tsige, “Carbon nanotube based groundwater remediation: the case of Trichloroethylene”, *Molecules* **2016**, 21, 953; doi:10.3390/molecules21070953
 16. Anil Karumuri, Lvmeng He and Sharmila M. Mukhopadhyay, “Tuning the Surface Wettability of Carbon Nanotube Carpets in Multiscale Hierarchical Solids”, *Applied Surface Science*, 327 (2015) 122–130.
 17. H. Vijwani, M. Nadagouda, V. Namboodiri and S. M. Mukhopadhyay “Hierarchical hybrid carbon nano-structures as robust and reusable adsorbents: Kinetic studies with model dye compound” *Chemical Engineering Journal* 268, 197-207, 2015. 1, 2015.
 18. B. T Quinton, K. Leedy, J. W Lawson; B. Tsao, J. D. Scofield, J. N Merrett, Q. Zhang, K. Yost and S. M Mukhopadhyay, “Influence of Oxide Buffer Layers on the Growth of Carbon Nanotube Arrays on Carbon Substrates”, *Carbon*, Volume 87, Pages 175–185, June 2015.
 19. Anil Karumuri, Adam A Maleszewski, Dhawal P Oswal, Heather A Hostetler, Sharmila M Mukhopadhyay, "Fabrication and Characterization of Antibacterial Nanoparticles Supported on Hierarchical Hybrid Substrates", *Journal of Nanoparticle Research*, March 2014, 16:2346
 20. Jared McCoppin, Thomas L. Reitz, Ryan Miller, Hema Vijwani, Sharmila Mukhopadhyay & Daniel Young, “Low Temperature Consolidation of Micro/Nanosilver Die-Attach Preforms”, *Journal of ELECTRONIC MATERIALS*, DOI: 10.1007/s11664-014-3257-4, 2014.
 21. Betty T. Quinton, Paul N. Barnes, Chakrapani V. Varanasi, Jack Burke, Bang-Hung Tsao, Kevin J. Yost, and Sharmila M. Mukhopadhyay, “A Comparative Study of Three Different Chemical Vapor Deposition Techniques of Carbon Nanotube Growth on Diamond Films,” *Journal of Nanomaterials*, vol. 2013, Article ID 356259, 9 pages, 2013.
 22. Natalia B. Shenogina¹, Mesfin Tsige, Soumya S. Patnaik, Sharmila M. Mukhopadhyay, “Molecular Modeling of Elastic Properties of Thermosetting Polymers Using a Dynamic Deformation Approach” *POLYMER*- Volume 54, Issue 13, 7 June 2013, Pages 3370–3376.

23. Anil K. Karumuri, Dhawal P. Oswal, Heather A. Hostetler and Sharmila M. Mukhopadhyay, "Silver nanoparticles attached to porous carbon substrates: robust materials for chemical-free water disinfection", *Materials Letters*, Volume 109, 15 October 2013, Pages 83–87.
24. Barney, I. T., Ganguli, S., Roy, A. K., & Mukhopadhyay, S. M. "Improved Thermal Response in Encapsulated Phase Change Materials by Nanotube Attachment on Encapsulating Solid." *J. Nanotechnol. Eng. Med.* 3(3), 031005 (Jan 18, 2013).
25. S. M. Mukhopadhyay, "Ultrahigh Surface area Supports for Nanomaterial Attachment", United States Patent Application Publication, Pub # US 2013/0130383 A1, May 23, 2013.
26. B.T. Quinton, Q. Zhang, J. Burke, K. Leedy, B. Tsao, J. Scofield, J.N. Merrett, K. Yost, S.M. Mukhopadhyay, "The Effects of Surface Treatments on the Growth of CNTs on 3-Dimensional Carbon Foam Structure", *Nanotech 2013 Vol. 1, 10, Nanoscience & Technology Institute*, 2013.
27. A. Mian, C. Taylor, S. Mukhopadhyay, K. Hartke, and L. Dosser, "Microstructural Analysis of Laser Micro-welds between Electrode Materials for Li-Ion Battery Applications," *Proceedings of 2013 ASME International Congress & Exposition*, November 2013.
28. Hema Vijwani and Sharmila M. Mukhopadhyay, "Palladium Nanoparticles on Hierarchical Carbon Surfaces: A New Architecture for Robust Nano-Catalysts Applied Surface Science", *Applied Surface Science*, 2012.
29. Elizabeth I. Maurer, Kristen K. Comfort, Saber M. Hussain, John J. Schlager, and Sharmila M. Mukhopadhyay, "Novel Platform Development using Assembly of Carbon Nanotube, Nanogold and Immobilized RNA Capture Element for Rapid, Selective Sensing of Bacteria", *Sensors* 2012, 12, 8135-8144;
30. Natalia B. Shenogina, Mesfin Tsige, Soumya S. Patnaik, and Sharmila M. Mukhopadhyay, "Molecular Modeling Approach to Prediction of Thermo-Mechanical Behavior of Thermoset Polymer Networks, *Macromolecules*, (2012).
31. Hema Vijwani, Abinash Agrawal, and Sharmila M. Mukhopadhyay, "Dechlorination of Environmental Contaminants Using a Hybrid Nanocatalyst: Palladium Nanoparticles Supported on Hierarchical Carbon Nanostructure", *Journal of Nanotechnology*, 2012,
32. Barney, I. T., Lennaerts, D. S., Higgins, S. R., & Mukhopadhyay, S. M. (2012), "Specific Surface Area of Hierarchical Graphitic Substrates Suitable for Multifunctional Applications", *Materials Letters*, 88, 160-163.
33. J. McCoppin, I. Barney, S. Mukhopadhyay, R. Miller, T. Reitz, D. Young, "Compositional control of continuously graded anode functional layer", *Journal of Power Sources* 215 (2012) 160-163.
34. N. B. Shenogina, M. Tsige, S. M. Mukhopadhyay, S. S. Patnaik, "Molecular Modeling of Thermosetting Polymers: Effects of Degree of Curing And Chain Length on Thermo-Mechanical Properties", *Proceedings of the 18th International Conference on Composite Materials (ICCM-18)*, Korea, 2011.

35. E. Maurer, S. Hussain and S. M. Mukhopadhyay, "Cell Growth in a Porous Microcellular Structure: Influence of Surface Modification and Nanostructures", *Nanoscience and Nanotechnology Letters*, Vol. 3, 1–4, (2011).
36. S. M. Mukhopadhyay, "Key Attributes of Nanoscale Materials and Special Functionalities Emerging from them" Chapter 1 in *Nanoscale Multifunctional Materials: Science and Applications*, Sharmila Mukhopadhyay (Ed.), Wiley, ISBN: 978-0-470-50891-6, October 2011.
37. S. M. Mukhopadhyay, "Societal Impact and Future Trends in Nanomaterials" Chapter 2 in *Nanoscale Multifunctional Materials: Science and Applications*, Sharmila Mukhopadhyay (Ed.), Wiley, ISBN: 978-0-470-50891-6, October 2011.
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39. J. Bozeman III, I. Barney, A. Jackson, S. M. Mukhopadhyay, and H. Huang, Pt-Skin Structured Bimetallic Catalyst Supported on nano-Ceria as Sulfur-tolerant Anodes For Fuel Cells, *ECS Transactions*, Volume 35, Issue 1, May , 2011.
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41. S. M. Mukhopadhyay and A. Karumuri, "Nanotube attachment to prevent interfacial delamination", *J. Phys. D: Appl. Phys.* 43 365301 (2010).
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43. S. M. Mukhopadhyay, "Nanoscale Multifunctional Materials: Nature Inspired Hierarchical Architectures", *AZO Nanotechnology Feature Article, Nanotechnology Thought Leaders Series* (2009).
44. Sharmila M. Mukhopadhyay, Anil Karumuri and Ian T. Barney, "Nanotube Grafting in Porous Solids for High Surface Devices", pp479-82, *Nanotech*, Vol. 3, (2009).
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VI. SAMPLE PLENARY, INVITED & KEYNOTE TALKS (LAST SEVEN YEARS)

1. Keynote Presentation, Hierarchical Biomimetic Nanocatalyst Architectures, Chemical Catalyst 2023, 4th Global Summit on CATALYSIS & CHEMICAL ENGINEERING, April 13-14, 2023 | Rome, Italy
2. Invited talk, SPIE Conference 12490 Surface Engineering and Forensics, 15 - 16 March 2023, Engineering surfaces for the future: Incorporating multifunctionality through hierarchical hybrid architectures, Sharmila M. Mukhopadhyay*
3. Invited talk, Bio-inspired multifunctional carbon scaffolds for tissue engineering, Symposium: Next Generation Biomaterials, MS&T, Oct 2023.
4. Invited talk, Synergizing Structural and Functional Hierarchy in Porous Catalysts and Sensors, Symposium on Synthesis, Characterization, Modeling and Applications of Functional Porous Materials, MS&T 2023.
5. Plenary, SPIE fourth international workshop on thin films for electronics, electro-optics, energy and sensors (TFE3S), Bio-mimetic nanostructured films for surface-active devices, Aug 2022
6. Invited talk, Robust & Reusable Nanostructures for thermal management and energy efficiency, Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials Symposium, MS&T22: Materials Science & Technology, Oct 2022
7. Invited talk, Porous solids with nanostructured surfaces for environmental applications, Synthesis, Characterization, Modeling and Applications of Functional Porous Materials Symposium, MS&T22: Materials Science & Technology, Oct 2022
8. Invited Symposium (virtual during pandemic), “Advanced Materials & Devices for Sensors and Intelligent Technologies”, Materials Science & Engineering Colloquium, Columbia University, March 19, 2021.
https://events.columbia.edu/cumc/event/showEventMore.rdo;jsessionid=rV0Nck9keQ0x88JeE1vz_6d95ConA4igAy-8-PCK.calprdapp06
9. Keynote lecture (Virtual during pandemic), “Advanced Multi-scale Materials: Hierarchical solids for Sensing, Catalysis, Energy Storage, and Tissue Engineering”, 2nd Virtual Congress on Materials Science & Engineering, March 2021.
10. “Materials for Next Generation Engineering: Balance and Sustainability” Air Force Institute of Technology Dean’s Distinguished Guest Speaker Series, July 2019
11. “Hierarchical Hybrid Nano-structured Materials for Energy, Environment and Biomedical Applications”, keynote lecture, Nanotech Forum, Zurich, 2019
12. “New Class of Materials for Multifunctional Devices” Invited Seminar, Imperial College & London Nanotech, London, UK, 2019
13. “Hierarchical Hybrid Architectures for Robust & Reusable Nano-Devices”, Keynote lecture in 18th International Conference in Materials Science and Engineering, Osaka, Japan, May 2018

14. “Emerging Materials for Next Generation Manufacturing” Invited seminar in National Metallurgical Laboratory, Jamshedpur, India, June 2018
15. “Next Generation Nanomaterials: Bioinspired Hierarchical Architectures” Engineering Colloquium Speaker, Miami University, Oxford, Ohio, 2019.
16. “Bioinspired 3D Carbon Architectures: Beyond graphene and nanotubes” Invited Talk at MS&T Symposium: Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials, Oct 2018.
17. “Surface Modification of Carbon Nanotube Carpets for Wettability Tailoring” Invited Talk in MS&T Symposium: Advances in Surface Engineering: Functional Coatings /Films/ Surface Features, 2018
18. Institute Keynote Lecture for Science Day Celebration at IIT Kanpur, India “Next Generation Nanotechnology: Balance and Sustainability”, March 2017
19. Invited Seminar at IIT, Delhi, “Next Generation Nanomaterials: Hierarchical Hybrid Architectures, Feb 2017
20. Invited Seminar at IIT Kharagpur, “Advanced Nanomaterials”, March 2017
21. Invited paper at International Symposium on Semiconductor Materials and Devices (ISSMD), “Next Generation Nanodevices: Hierarchical Hybrid Architectures”, March 2017
22. Invited Seminar at National Institute of Pharmaceutical Education and Research, Kolkata, “Nanotechnology and Next Generation Biomaterials”, 2017
23. Invited Seminar at US Consulate, Kolkata, “Nanotechnology: Economic and Social Impacts”, March 2017.
24. The National Academies, Jefferson Distinguished Lecture Series. “Emerging Materials for Next Generation Manufacturing, April, 2017.
25. Invited Lecture at SNBose Institute of Basic Sciences, "Emerging Materials for Next Generation Manufacturing", April, 2017.
26. Invited Lecture at International Conference in Materials Engineering, (ICME), IIT Kanpur, “Three-Dimensional Hierarchical Hybrid Architectures for Robust Multifunctional Materials”, June 2017
27. Invited talk at Collaborative Conference of Materials Research (CCMR), “Three Dimensional hierarchical Hybrid Materials”, Jeju Island, Korea, June 2017.
28. Invited Seminar at Seoul National University, S. Korea, “Next Generation Nanotechnology: Balance and Sustainability”, July 2017
29. Invited Seminar at Korea University, “Three-Dimensional Hierarchical Hybrid Architectures for Robust Multifunctional Materials” July 2017

VII. RESEARCH GRANTS AND CONTRACTS

Title	Sponsor	Amount (role)	Active Dates
Next Generation Harsh-Environment Materials and Techniques for Energy Sector Applications	DOE-EPSCOR	\$ 2,340,000 (co-PI with PI Pereira DaCunha)	09/21-08/23
MRI: Acquisition of a Scanning Transmission Electron Microscope for Research in Northern New England	NSF and Dartmouth	\$2,200,000 total (Senior Personnel with PI Baker, UMaine to operate with remote access station)	09/22-08/25
MRI: Acquisition of LA-HR-ICPMS Instrumentation for Climate, Environmental, Ecosystem, and Engineering Research at the University of Maine	NSF	\$ 661,462 (co-PI, with PI Kreutz)	05/22 - 4/25
REU Supplement: Bio-inspired 3D Materials	NSF	\$ 12,000 (PI)	5/19-12/20
EAGER: Novel Bio-inspired 3D Materials for Surface-Active Devices	National Science Foundation	\$162,000 (PI)	9/17-12/20
DURIP: Core Microstructural Characterization with Scanning Electron Microscope & X-Ray Diffraction Instrument	AFOSR	\$1,200,000 (Senior Investigator with PI Rumirez)	9/19-8/22
EAGER: Novel catalyst design by tailored integration of nanomaterials with larger porous scaffolds	National Science Foundation	\$107,995 (PI)	9/14-8/18
DERA award through ORISE	EPA & AFIT	\$60K/year (PI)	9/15-8/17
Water Purification Using Nano-enabled Solutions	Ohio Third Frontier	Total \$2,000,000 (co-PI with industry lead)	10/11-1/14
“Behavior of Carbon Nanomaterials in Aqueous Suspensions of Natural Organic Matter”	Environmental Protection Agency (EPA)	\$ 400,000 (co-PI with PI Kline)	03/09-01/13
“Thermally responsive Encapsulated Phase Change Materials”	AFRL-DAGSI	\$ 126,681 (PI)	6/09-6/13
Influence of Water Quality on the	Environme	\$1,000,000	03/09-

Bioavailability and Food Chain Transport of Carbon Nano-particles	ntal Protection Agency	(Co-PI with PI Kline)	01/13
Nanoparticles for Water Purification	State of Ohio: Commercialization	\$25,000(PI)	11/11-9/12
Simulation of Small-Scale Damage Evolution	UES SBIR Phase I	\$26,962 (PI)	6/12-1/13
A molecular modeling approach to predicting elastic and failure behavior of thermosetting polymers	AFOSR	\$ 450,000 (PI)	07/09-06/12
Multifunctional Nanomaterials	Ohio Third Frontier	\$16,000 (PI)	07/10-3/11
Nano-engineering of Microcellular Foam for Biocompatibility of Bone Cell (PI)	AFRL-DAGSI	\$ 71,569 (PI)	6/08-6/10
Surface Modification of Porous Carbon Structures	AFRL-GrafTech-DAGSI	\$40,000 (PI)	07/10-06/11
“Functionalization of Carbon with Metal Based Nanoparticles”	AFRL-DAGSI	\$ 72,501 (PI)	6/09-6/11
Wright Center for Multifunctional Polymer nanomaterials & Devices	Ohio Department of Development	Total \$22,489,845 (co-PI with PI Mikesell)	10/05-09/10
Performance Enhancement of Coated Conductors by Investigation of Flux Pinning and AC Loss Issues.	DOE	\$953,601 (PI)	6/04-12/05
ADVANCE: In the footsteps of Katharine Wright: Promoting STEM Women through LEADER	NSF	\$2,863,000 (Senior Investigator, with PI Wheatley)	8/08-7/13
Materials Characterization	CENSMM member companies	\$70,000 (PI)	10/07-9/09
Seed Grant-Center for Nanoscale Multifunctional materials (CENSMM)	Ohio Board of Regents-Research Challenge	\$60,000 (PI)	6/07-5/08

Characterization of Surface Modified Substrates and Particulates using XPS	P&G Inc.	\$100,000 (PI)	5/05-5/07
Fabrication of High Jc Coated Conductors Using Colloids of Un-agglomerated Nanoparticles	DOD/STTR	\$100,000 (co-PI with industry lead)	7/05-4/06
Hybrid Structures	AFRL	\$28,600 (PI)	9/06-8/07
Science and Engineering of Carbon Foams	AFOSR	\$78,000 (PI)	10/02 - 9/05
"High pressure Plasma Processes"	Major Industry	\$218,000 (PI)	3/01-5/03
"Surface Modification of Nano-structured Solids"	Ohio Board of Regents	\$40,000 (PI)	6/03-12/04
" Thin Film Characterization Using XPS"	Proctor & Gamble	\$86,000 (PI)	6/03-5/05
"Acquisition of High Resolution XPS facility"	NSF-MRI	\$ 300,000 (PI)	9/98 - 8/02
" High Resolution XPS facility"	Ohio Board of Regents: Action Fund	\$150,000 (PI)	9/98 - 8/02
"Characterization of Thin Film Superconductors"	Air Force Research Laboratory	\$17,160 (PI)	5/01-6/02
"Plasma Polymer Characterization using XPS"	Proctor & Gamble	\$64,000 (PI)	6/01-5/03
" Characterization of Thin Film Surfaces using XPS"	Proctor & Gamble Inc.	\$25,000 (PI)	4/00 - 3/01
"Nano-structure of Carbon Core Materials"	Air Force - Materials	\$25,000 (PI)	10/00-9/01
" Characterization of Carbon Materials"	Air Force-MLBC	\$25,498 (PI)	7/99-9/00
"YBCO Toroid for Gravity Shielding"	NASA - with SCI Inc.	\$20,028 (PI)	8/99-9/01
"Characterization of Sub-micron	SCI Inc	\$5,000 (PI)	3/98 -

Particles"			2/99
"Doping of BSSCO Superconductors"	Plastronics	\$5,000 (PI)	4/98 - 9/98
" High Resolution XPS facility"	WSU Matching Fund	\$150,000 (PI)	9/98 - 8/02
"Nano-Structure-Property Relationships	Ohio Board of Regents Research Challenge	\$20,000 (PI)	6/00-5/01
"Surface Engineering of Complex Solids"	Ohio Board of Regents-TCG	\$41,000 (PI)	7/02-6/03
"Surface Chemistry of Plasma Polymer Films"	Ohio Board of Regents (OBOR)	\$30,000 (PI)	6/01 - 5/02
Interfacial Bonding in C-Reinforced Composites	Ohio Board of Regents	\$18,410 (PI)	6/99-5/00
"Surface Phenomena in Superconducting Oxides"	Ohio Board of Regents	\$15,155 (PI)	1/99-12/99
"Interfacial Tailoring of Engineering Materials"	Ohio Board of Regents	\$38,677 (PI)	1/98 – 6/00
"Influence of Dopants on Metal-Ceramic Bonding"	NSF-DMR	\$185,900 (PI)	'91-'94
"Surface Science Laboratory"	Teagle Foundation	\$150,000 (PI)	'90-'92
"Improvement of the Superconductor-Metal Interface"	NSF-DMR	\$20,090 (PI)	'95-'96
"Surface Composition of Particulate Matter"	EPA	\$10,000 (PI)	'95-'96

VIII. CLASSROOM TEACHING

Courses taught and new courses developed:

COURSES	Info
Advances in Materials – I & II (developed new interdisciplinary course sequence)	Core course sequence for new programs at UMaine

Advanced Engineering Materials (developed new course)	Grad Core
Phase Transformations	Grad Core
Thermodynamics (developed for multi-disciplinary student cohort: Mechanical, Materials & Clean Energy)	Grad Core
Ceramics for Advanced Applications (developed new)	Grad Core
Materials for Nanotechnology (developed new course)	Grad Elective
Materials Thermodynamics	Undergrad Core
Diffusion and Kinetics	Undergrad Core
Intro. to Ceramics	Undergrad Core
Physical Ceramics	Elective
Materials Engineering Science	Undergrad Core
Structure and properties of Materials II	Undergrad Core
Engineering Materials	Undergrad Core
X-Ray Diffraction	Grad/Undergrad Elective
Structure- Prop. Relationship in Crystals	Ph.D. Core
Electro-ceramics (developed new course)	Advanced Grad Elective
Introduction to Engineering: co-teaching with other departments	Freshmen Engineering Competitions
Introduction to Design: co-teaching with others	Freshmen Design
Ceramics	Grad & Undergrad Core
Analytical Techniques	Grad Advanced Elective

IX. MENTORING AND SUPERVISION

Research Associates and Post-Doctoral Researchers mentored:

1. Dr. Manisha Choudhury, 2022-present (Jointly with Civil & Environmental Engineering)
2. Dr. Wenhui Wang, 2020-present (Strategic Multidisciplinary Program Development)
3. Dr. Al Jackson, 2007-2012 (Wright State Nano-Center Manager & Industry Liason)
4. Dr. Natalia Shenojina, 2010-2013 (Molecular Modeling with Air Force and U. Akron)
5. Dr. Jianhua Sun, 2005-2007 (DOE Project with SUNY Albany and AFRL)
6. Dr. Farhad Miralai, 2003-2005 (Industrial Collaboration with Proctor & Gamble)

Thesis/Dissertation Directed

1. Ph.D. (Sathvik Pedamella) – Nanomaterials for future Devices. started Jan 2024
2. M.S. (Sanskar Shresta) – Nanoelectrodes for pollutant sensing, started Jan 2023
3. Ph.D. (Soham Parikh) – Nanomaterials for biological tissue scaffolding, completed 2021.
4. Ph.D. (Wenhui Wang) – Multiscale Flexible Structures for Catalysis and Pollutant Degradation, completed 2020.

5. M.S. (Kimia Kiwei) – Fluid interaction with multiscale surfaces, 2019
6. Ph.D. (Betty Quinton) – Carbon Nanostructures for Power Electronics, 2016.
7. Ph.D. (Hema Vijwani) – Hierarchical Carbon Substrates and Nano-Catalysts S 2015
8. M.S. (Lvmeng He) – Surface Modification of Hierarchical Structures, Su 2015
9. Ph.D. (Anil Karumuri) – Porous Nano-structures and Their Adaptation for Environmental Remediation Applications, S 2014
10. Ph.D. (Ian Barney) – Nanoscale Structures for Enhanced Functionality, F 2012
11. Ph.D. (R. V. Pulikollu) -- Nano-Coatings on Carbon Structures for Interfacial Modification, F 2005.
12. Ph.D. (P. Joshi) -- Study of Growth and Characterization of Nano-Coatings on Solids for Surface Modification, Completed F 2004.
13. Ph.D.(Chao Wei)-- Influence of Br on High Temperature Superconductors, Completed, May 1997.
14. Ph.D.(Tim C.S. Chen)-- Study of Oxide-Metal Interfaces Using Electron Spectroscopy, Completed, August 1995.
15. M.S. (Beth Maurer) – Cell Growth in a Porous Microcellular Structure, 2010.
16. B.S. Honors Thesis (Timothy Smith) – High Temperature Solid Lubricants: 2010.
17. M.S. (Hema Vijwani) – Highly Active Porous Catalysts by Attachment of Metal Nanoparticles on Hierarchical Structures, 2011
18. M.S. (Adam Maleszewski) – Functionalization of Carbon Nanotubes for Biological Sensors), 2011.
19. M.S. (A. Karumuri) – Multifunctional Coatings on Microcellular Foams, F 2009.
20. M.S. (J. Kell) -- Thin Film Coated Conductors, Summer 2007.
21. M.S. (D. Sharma) -- High Temperature Coatings on Carbon, Spring 2007.
22. M.S. (S. Vemulakonda) -- Characterization of Thin Film Coated Conductors, 2008.
23. M.S. (V. Chintamamneni) -- Composition and Chemistry of High Temperature Superconductors, July 2006.
24. M.S. (S. Krishnaswami) -- Characterization of Superconducting Films, Completed July, 2002.
25. M.S. (P. Joshi) -- Plasma Polymer Modification of Surfaces, Completed Dec. 2001
26. M.S. (N. Mahadev) -- Interface Modification of Superconductors, Completed Sept. 2000.
27. M.S.(Tim C.S. Chen)-- Ar Sputtering in Oxides Studied by ESCA, completed, April 1993.
28. M.S. (J. Tolliver) -- Pulsed Laser Deposition of Thin Film Coated Conductors, completed, 2004.
29. M.S. (Nick Yust, Co-advisor with R. Srinivasan)--, "Textured Copper Substrates for Second Generation High temperature superconductors", completed, Nov. 2003.

ADDITIONAL STUDENT MENTORING

In addition to the students listed above, I have co-mentored 35 thesis and dissertation students as committee member/co-advisor, 45 undergraduate students for summer research and capstone design projects and ten precollege summer students.

X. SERVICES TO PROFESSIONAL ORGANIZATIONS

<u>ORGANIZATION</u>	<u>Position</u>
National Academies and US Department of State	Scientific Advisor as Jefferson Science Fellow, 2016-17 Distinguished Speaker Series at the Academies Advocate for Bilateral/Multilateral S&T Initiatives.
Nanomaterials (IF 5.7)	Guest Editor, “Multifunctional Nanomaterials and Hybrid Structures for Sensors, Actuators and Smart Technologies”, 2022-23
Journal of Nanotechnology (IF 4.2)	Guest editor, Multifunctional Nanomaterials for Biomedical Engineering: Unique Properties, Fabrications, Diverse Applications, 2014-2015
Journal of Nanotechnology	Guest Editor of Special Edition: Nanomaterials Synthesis, Applications, and Toxicity 2012
Metallurgical and Materials Transactions	President of Editorial Board 2014-2015 Board member since 2007
American Ceramic Society (National)	Elected Fellow, Past Chair of Electronics Division, & Nominating Committee
Materials Science and Technology (MS&T)	Invited speaker, symposium organizer, panelist and judge, 2006-present
Materials & Devices Workshop	Invited Speaker, Nov 2012
Indian Institute of Technology, Madras	Ph.D. Thesis, International Reviewer, 2014
ASM International, Dayton Chapter Materials Advantage, WSU Chapter	Executive Committee 1998-present Faculty Advisor 2001-04
American Chemical Society	Invited Speaker and Student Poster Judge 2012
ASM International, Dayton Chapter	Executive Committee
National Science Foundation	Panel & Mail Reviews, typically 1-2 per year
Peer Reviewed Medical Research Program (PRMRP)	Reviewer, 2016
Indian Institute of Technology, Bombay	Ph.D. Thesis, International Reviewer
Jadavpur University	Invited speaker, 2008-10, Advisory Committee for International Symposium 2010, Ph.D. Reviewer
Saha Institute of Nuclear Physics	Invited speaker 2007-8, Review Panel
Carbon	Reviewer

IEEE	Reviewer
ASME-Special Issue	Reviewer
Journal of App Phys./Applied Phys. Letters	Reviewer
Journal of Membrane Research	Reviewer
Journal of Electronic Materials	Reviewer
Journal of Coatings and Technology	Reviewer
Journal of Biomedical Materials	Reviewer
Journal of American Ceramic Society	Reviewer
ACS Applied Materials and Interfaces	
US Civilian R&D Foundation	Proposal Reviewer
Israel Science Foundation	Proposal Reviewer
TMS: Surfaces and Interfaces in Nano-structured Materials,	Lead Organizer of symposium sequence, 3/04 and 3/06
"Interfaces in Electronic Materials"	Co-organizer and proceedings Editor, Orlando, Fl, 2003
ASM- Student Symposium	Organizer and Chair-1998, 2000
Ohio Innovation Summit (OIS), and University Clean alliance of Ohio (UCEAO)	presenter, panelist, co-organizer and exhibitor

XI. SERVICES TO PRIOR UNIVERSITY (WSU)

University level committees (WSU)

Search Committee: Vice President of Research	2005, 2012
Search Committee: Dean of Engineering & Computer Science	2013
Search Committee: Associate Dean of Research	2013
Faculty Budget Priority Committee	2009-12
Leadership Team, NSF ADVANCE Program	2008-
Search Committee: Vice President of Research	2006-07
Search Committee: Director of RSP	2005
Board of Trustees: Academic Affairs	2005-06
Center for Women's Studies-Advisory Board	2004-08
University Honors Committee	2002-03
University Technology Council	1999-00
UCAPC	2003-04

College of Engineering Committees at WSU

Scholarship Committee	2008-12
Graduate Curriculum Committee	2012- 14
Engineering Ph.D: Materials & Nanotechnology Focus Area, Chair	2004-06, 2014-16

Faculty Development Committee	2006-09
Department Chair Search Committee	2005-06
Curriculum Committee	2003-04
By-Laws Review Committee	1998-00
Academic Computing Committee	1998-01
Academic Computing Committee	1999-00
Expenditure of Technology Fee	1998-01
Associate Dean Search Committee	2001

Departmental Committees at WSU

Chair, Graduate Curriculum Committee	2011-2019
Chair Advisory Committee	2006-2017
Assistant Chair Search Committee	2006-07
Petitions	1998-04
Materials Program	1997- Chair 2014-2019
Faculty Development Committee	2000-2019
Materials Faculty Search Committees	2001-2019
MS Program in Clean Energy	2007-08
Program Director-MS in Materials Sci & Eng	2017-2019

XII. SAMPLE COMMUNITY OUTREACH AND DIVERSITY EFFORTS

- Senior leadership for Advance Program to promote Women in Engineering.
- Participation in leadership panels and think tanks for popularizing science among younger children, often from under-privileged backgrounds.
- Prepare lecture slides for colleagues and teachers to present at rural and underserved communities.
- Regularly collaborate with non-profits in India to raise health and hygiene awareness among underserved children: This includes yearly visits and remote help to arrange tutors and personal coaches and help with procurement of school supplies, lunch funds etc.
- Served as Board Member of neighborhood Homeowners Association (HOA) in Ohio.
- Talks and promotional materials to increase STEM awareness among teachers and students: avenues include PubScience (talk at Pubs attended by local community members), Science Days, Science Museum events, and local street fairs.
- Multiple summer mentoring of K-12 students and Science Teachers (mostly female and inner-city participants) through NSF-REU, NSF-RET, ASM summer camp, and other agencies.
- Served as translator for medical information pamphlets for rural NGOs in India
- Board service for non-profit and cultural organizations in Dayton, Ohio.

- Involvement in community outreach within the greater Dayton community: Examples include disaster relief, soup kitchens etc.
- Volunteered at local high school math and debating clubs: provided policy advice and logistic support.
- Regularly provide non-technical briefings to TV and newspaper reporters about recent scientific advancements.
- Served as judge for multiple student speaking and poster contests at local, national, and international meetings. Hosts have included variety of organizations such as American Chemical Society, American Ceramic Society, Materials Science and Technology, ASM Dayton Chapter, Environmental Effects of Nanoparticles and Nanomaterials, etc.
- Sponsored networking meetings with community and professional organizations for connecting advocacy groups with scientific experts.
- Multiple planning efforts with local organizations for collaborative team building and multi-institutional project solicitations.
- Panelist & Judge: Local science fair projects, Women in Engineering and Women in Science events.
- Judge, Student Poster Contests: Hosted by Ceramic Education Council and other organizations, American Chemical society, Annual Meetings of American Ceramic Society, and MS&T meetings, 2001-present.
- Organizer and Chair - Dayton Area Graduate Student Symposium of Materials (DASSOM).
- Served three terms as Chair of the Hoffman Scholarship Program for junior students in Materials (Nationally). 2001-04.
- Overseeing the committee for best student presentation award in the Electronics Division symposium at the affiliated Fall meetings, 2002-04.

XIII. SAMPLE MEDIA RELEASES ABOUT MY WORK

- <https://umaine.edu/epscor/2023/10/05/from-lasst-to-first/>
- http://www.bizjournals.com/dayton/potmsearch/detail/submission/5483312/Sharmila_Mu_khopadhyay?l=&time=&ind=&type=&id=2016-01-26&ro=1
- <http://www.dayton.com/news/news/local/wright-state-professor-named-us-foreign-policy-gro/np9HM/>
- http://sites.nationalacademies.org/PGA/Jefferson/PGA_169847
- <http://www.azonano.com/article.aspx?ArticleID=2499>
- <http://www.materialstoday.com/carbon/news/carbon-scaffolds-give-muscle-cells-the-right-cues/>
- <http://phys.org/news/2012-01-watershed-moment-purification.html>
- <http://www.nanowerk.com/news/newsid=23972.php>

- <http://www.homelandsecuritynewswire.com/dr20120117-innovative-method-of-water-purification>
- <http://ceramics.org/ceramic-tech-today/cnt-nanobrushes-coated-with-nanocatalysts-show-promise-for-cleaning-polluted-water>
- <http://www.daytondailynews.com/news/business/wsu-researcher-creates-nano-brushes-that-remove--1/nMy2B/>
- <https://www.24-7pressrelease.com/press-release/468355/dr-sharmila-mitra-mukhopadhyay-presented-with-the-albert-nelson-marquis-lifetime-achievement-award-by-marquis-whos-who>
- <http://www.frogheart.ca/?tag=sharmila-mukhopadhyay>
- <http://phys.org/news2386.html>