Divita MATHUR
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Current Appointments

07/2022 – Assistant Professor, Dept of Chemistry, Case Western Reserve University, Cleveland, OH
- Research: Merge the architectural and biological properties of nucleic acids for biomedical and nanoscale applications.
- Teaching: Serve as a learning conduit in Chemical Biology for CWRU students.

Education

Iowa State University, Ames, IA — Ph.D., 2010-2016
Major: Bioinformatics & Computational Biology
Dissertation: *Dynamic Self-Assembling DNA Nanosystems: Design and Engineering.*

Delhi Technological University, New Delhi, India — B.E., 2006-2010
Major: Biotechnology

Previous Research Experience

2016 – 2022 Postdoctoral Scientist, Center for Bio/Molecular Science and Engineering, US Naval Research Laboratory, Washington, DC
Advisor: Dr. Igor Medintz
- Team member of a group focussed on the development of high efficiency bio-inspired light-harvesting networks, and novel biomaterial sensors based on the interface of optically active components and biological moieties.

2011 – 2016 Graduate Research Assistant, Department of Genetics, Development, and Cell Biology, Iowa State University, Ames, IA
Advisors: Dr. Eric Henderson & Dr. Jack Lutz
- Facile and scalable engineering of DNA nanostructures using DNA *scaples*.
- Engineering of a dynamic DNA nanosystem for interrogating molecular interactions.

Current Funding

2025 – 2030 NSF CAREER Award
- Division of Chemical, Bioengineering, Environmental and Transport
- Award No: CBET-2439298
- Title: *Structural Implications of Nucleic acid Nanoparticles on their subcellular transcription, translation, and transport*
- This CAREER award will support the development of integrated teacher-scholar activities to study the role of nucleic acid nanoparticles in their subcellular interactions.
- Role: Principal Investigator
- Total cost (with IDC): $695,000

2022 – 2025 NIH K99/R00 Pathway to Independence Award
- IC: National Institute of Biomedical Imaging and Bioengineering
- Award No: R00EB030013-03
- Title: *Cytosolic Access and Instability of DNA nanoparticles*
- The goals of this project are to study the cytosolic access and stability of small DNA nanoparticles by the integration of calcium and identify preliminary mechanisms of breakdown of DNA nanoparticles in the cell cytosol.
- Role: Principal Investigator
- Total cost (with IDC): $747,000

2023 – 2024 Material Data Science MDS-Rely Project
- Title: *Predictive Framework to Indicate the Age of Plastics for Proper Recycling*
- To target the plastic waste value chain, we will develop a framework for indicating the age of plastics to facilitate their classification prior to the recycling process.
- Role: Co-PI
- Total direct cost: $43,162

2024 – 2025 CWRU Glennan Fellows Program
- Title: *Experiential Learning in Bioconjugate Chemistry using Mixed Reality*
- To develop pedagogical approaches to teach students how molecules behave in 3D space using mixed reality.
- Role: PI
- Total direct cost: $6,500.

Pending Funding as PI

2025 – 2026 Expanding Horizons Initiative Disciplinary Grant
- CWRU
- Award No: N/A
- Title: *Exploring feasibility of building DNA flexagon nanoparticles for various applications*
- We will create a novel class of reversible morphing NPs, called "DNA flexagons." DNA . flexagons would monitor changes in hydrophobicity and pH in the environment by switching states (or "flexing").
- Role: Principal Investigator
- Total cost: $18,000

Previous Funding

2023 – 2024 CWRU Expanding Horizons Initiative
- Title: *Fluorescent Ophthalmic Viscosurgical Devices for Cataract Surgery*
- The proposed work will develop fluorescent viscoelastic polymers to improve ocular surgical environments during cataract rectification.
- Role: co-PI
- Total direct cost: $30,000

2023 – 2024 CWRU Expanding Horizons Initiative
- Title: *Plant Transformation using Nucleic Acid Nanoparticles*
- The proposed work seeks to develop DNA nanoparticles as vehicles for delivering proteins and genes into plants.
- Role: PI
- Total direct cost: $30,000

2023 – 2024 Research Corporation for Science Advancement (RCSA)
- Title: *Beam Shaping Metasurfaces using DNA Alignment and Liquid Crystals*
- The objective of this project is to advance live-cell microscopy by introducing polarization-controllable beamshaping metasurfaces that leverage molecular mechanisms for image processing.
- Role: PI
- Total direct cost: $50,000

2021 – 2022 NIH K99/R00 Pathway to Independence Award
- IC: National Institute of Biomedical Imaging and Bioengineering
- Award No: 1K99EB030013-01A1
- Title: *Cytosolic Access and Instability of DNA nanoparticles*
- The goals of this project are to study the cytosolic access and stability of DNA nanoparticles by the integration of calcium and use of noncanonical nucleic acids, and identify the rate of breakdown and mechanisms of stabilization of DNA nanoparticles in the cell cytosol.
- Role: Principal Investigator
- Annual direct cost: $86,000 (K99 Phase)

Publications (Citations: 1046; h-index: 20)

Journal Articles since joining CWRU (*corresponding author; +CWRU graduate student author; +CWRU undergraduate student author)

1. Yuan, Y.+, Beilharz, S.+, Everson, H.R.+, Nupnar, N.+, Debnath, M.K., Vinella, D.+, Urueña, J.M., Õrge, F.H., Hore, M.J., **Mathur, D.**, Karayilan M. *Injectable Fluorescent Bottlebrush Polymers for Interventional Procedures and Biomedical Imaging.* **Biomacromolecules** 2025, DOI: 10.1021/acs.biomac.4c01550.

2. Neyra, K.+, Desai, S.+, **Mathur, D.*** *Plugging synthetic DNA nanoparticles into the central dogma of life.* **Invited, ChemComm** 2025, DOI: 10.1039/d4cc04648j. Impact Factor: 6.2.

3. Wright, N.D., Barclay, M.S., Díaz, S.A., **Mathur, D.**, Ellis, G.A., Knowlton, W.B., Yurke, B., Davis, P.H., Medintz, I.L., Melinger, J.S., Pensack, R.D.*, Turner, D.B.* *Varying Line-Broadening Sources by Tuning the Composition of DNA-Assembled Cyanine Tetramer Aggregates.* **The Journal of Physical Chemistry C** 2024, DOI: 10.1021/acs.jpcc.4c03246. IF: 3.7.

4. Galvan, A.R., Green, C.M., Hooe, S.L., Oktay, E., Thakur, M., Díaz, S.A., Veneziano, R., Medintz, I.L.*, **Mathur, D.*** *Design and Characterization of a Gene-Encoding DNA Nanoparticle in a Cell-Free Transcription–Translation System.* **ACS Applied Nano Materials** 2024, DOI: 10.1021/acsanm.4c01456. IF: n/a.

5. Everson, H.R.+, Neyra, K.+, Scarton, D.V., Chandrashekhar, S., Green, C.M., Schmidt, T-L., Medintz, I.L., Veneziano, R.*, **Mathur, D.*** *Purification of DNA Nanoparticles Using Photocleavable Biotin Tethers.* **ACS Applied Materials and Interfaces** 2024, DOI: 10.1021/acsami.3c18955. IF: 9.5.

6. Díaz, S.A., Kim, Y.C., Cunningham, P.D., **Mathur, D.,** Medintz, I.L., Kellis, D.L., Yurke, B., Knowlton, W.B., Melinger, J.S.* *Excitonically Coupled Cyanine Dye Dimers as Optical Energy Transfer Relays on DNA Templates.* **ACS Applied Optical Materials** 2024, DOI: 10.1021/acsaom.3c00459. IF: -.

7. Green, C.M., Sementa, D., **Mathur, D.**, Melinger, J.S., Deshpande, P., Elbaum-Garfinkle, S., Medintz, I.L., Ulijn, R.V., Díaz, S.A.* *Sequestration within peptide coacervates improves the fluorescence intensity, kinetics, and limits of detection of dye-based DNA biosensors* **Communications Chemistry** 2024, DOI: 10.1038/s42004-024-01124-3. IF: 6.6.

8. Neyra, K.+, Everson, H.R.+, **Mathur D.*** *Dominant Analytical Techniques in DNA Nanotechnology for Various Applications* **Analytical Chemistry** 2024, DOI: 10.1021/acs.analchem.3c04176. IF: 8.0. **Journal Cover**

9. Medintz, I.L., **Mathur, D.*** *The potential of DNA nanotechnology to advance multiple therapeutic systems.* **Invited, Therapeutic Delivery** 2023, DOI: 10.4155/tde-2023-0060. IF: 2.5.

10. **Mathur, D.**, Díaz, S.A., Hildebrandt, N., Pensack, R. D., Yurke, B., Biaggne, A., Li, L., Melinger, J. S., Ancona, M. G., Knowlton W. B., Medintz, I. L. *Pursuing excitonic energy transfer with programmable DNA-based optical breadboards.* **Chemical Society Reviews** 2023, DOI: 10.1039/d0cs00936a. IF: 60.6.

11. Oktay, E., Bush, J., Vargas, M., Scarton, D.V., O'Shea, B., Hartman, A., Green, C.M., Neyra, K.+, Gomes, C.M., Medintz, I.L., **Mathur, D.***, Veneziano, R*. *Customized Scaffolds for Direct Assembly of Functionalized DNA Origami.* **ACS Applied Materials and Interfaces** 2023, DOI:10.1021/acsami.3c05690. IF: 10.383.

12. Oktay, E., Alem, F., Hernandez, K., Girgis, M., Green, C., **Mathur, D.**, Medintz, I.L., Narayanan, A., Veneziano, R. *DNA origami presenting the receptor binding domain of SARS-CoV-2 elicit robust protective immune response*. **Communications Biology** 2023, DOI: 10.1038/s42003-023-04689-2. IF: 6.5.

13. **Mathur, D.***. Galvan, A.R., Green, C.M., Liu, K.+, Medintz, I.L., *Uptake and Stability of DNA Nanostructures in Cells: A Cross-Sectional Overview of the Current State of the Art*. **Nanoscale** 2023, DOI: https://doi.org/10.1039/D2NR05868E. IF: 8.3.

14. Díaz, S.A.*, Patten, L.K., Pariona, G.P., Meares, A., Chiriboga, M., Susumu, K., Roy, S.K., Knowlton, W.B., Cunningham, P.D., **Mathur, D.,** Yurke, B., Medintz, I.L., Lee, J.*, Melinger, J.S.*, *Towards Control of Excitonic Coupling in DNA-Templated Cy5 Aggregates: The Principal Role of Chemical Substituent Hydrophobicity and Steric Interactions.* **Nanoscale** 2023, DOI: 10.1039/D2NR05544A. IF: 8.3.

15. Chiriboga, M.C., Green, C.M., **Mathur, D.,** Hastman, D.A., Melinger, J.S., Veneziano, R., Medintz, I.L., Díaz, S.A.*, *Structural and optical variation of pseudoisocyanine aggregates nucleated on DNA substrates.* **Methods and Applications in Fluorescence** 2023, DOI: 10.1088/2050-6120/acb2b4 IF: 3.21.

16. Rolczynski, B.S.*, Díaz, S.A., Kim, Y.C., **Mathur, D.,** Klein, W.P., Medintz, I.L., Melinger, J.S.*, *Determining Interchromophore Effects for Energy Transport in Molecular Networks Using Machine-Learning Algorithms*. **Physical Chemistry Chemical Physics** 2023, DOI: 10.1039/D2CP04960K. IF: 3.67.

17. **Mathur, D.**, Thakur, M., Díaz, S.A., Susumu, K., Stewart, M.H., Oh, E., Walper, S.A., Medintz, I.L., *Hybrid Nucleic Acid-Quantum Dot Assemblies as Multiplexed Reporter Platforms for Cell-Free Transcription Translation-Based Biosensors.* **ACS Synthetic Biology** 2022 DOI: 10.1021/acssynbio.2c00394. IF: 5.11. **Journal Cover.**

18. Huff, J.S., Díaz, S.A., Barclay, M.S., Chowdhury, A.U., Chiriboga, M., Ellis, G.A., **Mathur, D.**, Patten, L.K., Roy, S.K., Sup, A., Biaggne, A., Rolczynski, B.S., Cunningham, P.D., Li, L., Lee, J., Davis, P.H., Yurke, B., Knowlton, W.B., Medintz, I.L., Turner, D.B., Melinger, J.S., Pensack, R.D., *Tunable Electronic Structure*

via DNA-Templated Heteroaggregates of Two Distinct Cyanine Dyes. **The Journal of Physical Chemistry C** 2022 DOI: 10.1021/acs.jpcc.2c04336. IF: 4.126.

Journal Articles prior to CWRU

19. **Mathur, D.***, Rogers, K.E., Díaz, S.A., Muroski, M.E., Klein, W.P., Nag, O.K., Lee, K., Field, L.D., Delehanty, J.B., Medintz, I.L.*, *Determining the Cytosolic Stability of Small DNA Nanostructures in Cellula.* **Nano Letters** 2022 DOI: 10.1021/acs.nanolett.2c00917. IF: 11.19. **Journal Cover.**

20. Chowdhury, A.U., Díaz, S.A., Huff, J.S., Barclay, M.S., Chiriboga, M., Ellis, G.A., **Mathur, D.**, Patten, L.K., Sup, A., Hallstrom, N., Cunningham, P.D., Lee, J., Davis, P.H., Turner, D.B., Yurke, B., Knowlton, W.B., Medintz, I.L., Melinger, J.S., Pensack, R.P., *Tuning between Quenching and Energy Transfer in DNA-Templated Heterodimer Aggregates.* **The Journal of Physical Chemistry Letters** 2022 DOI:10.1021/acs.jpclett.2c00017. IF: 6.475.

21. Meares, A., Susumu, K., **Mathur, D.**, Lee, S.H., Mass, O.A., Lee, J., Pensack, R.D., Yurke, B., Knowlton, W.B., Melinger, J.S., Medintz, I.L., *Synthesis of Substituted Cy5 Phosphoramidite Derivatives and Their Incorporation into Oligonucleotides Using Automated DNA Synthesis.* **ACS Omega** 2022 DOI:10.1021/ acsomega.1c06921. IF: 3.512.

22. Chiriboga, M.C., Green, C.M., Hastman, D.A., **Mathur, D.**, Wei, Q., Díaz, S.A., Medintz, I.L., Veneziano, R., *Rapid DNA origami nanostructure detection and classification using the YOLOv5 deep convolutional neural network.* **Scientific Reports** 2021 DOI:10.1038/s41598-022-07759-3. IF: 4.379.

23. Chiriboga, M.C., Díaz, S.A., **Mathur, D.**, Hastman, D.A., Melinger, J.S., Veneziano, R., Medintz, I.L., *Understanding Self-Assembled Pseudoisocyanine Dye Aggregates in DNA Nanostructures and Their Exciton Relay Transfer Capabilities.* **The Journal of Physical Chemistry B** 2021 DOI:10.1021/acs.jpcb.1c09048. IF: 2.991. **Journal Cover.**

24. **Mathur, D.**; Samanta, A.; Ancona, M.; Díaz, S.A.; Kim, Y.C.; Melinger, J.S.; Goldman, E.R.; Sadowski, J.P.; Ong, L.L.; Yin, P.; Medintz, I.L., *Understanding Förster Resonance Energy Transfer in the Sheet Regime with DNA Brick-Based Dye Networks*. **ACS Nano** 2021, **15** (10), 16452–16468. IF: 15.88.

25. Cunningham, P. D.; Spillmann, C. M.; Melinger, J. S.; Ancona, M. G.; Kim, Y. C.; **Mathur, D.**; Buckhout-White, S.; Goldman, E. R.; Medintz, I. L., *Förster Resonance Energy Transfer in Linear DNA Multifluorophore Photonic Wires: Comparing Dual versus Split Rail Building Block Designs*. **Advancd Optical Materials** 2021, **9**, 2100884. IF: 9.9. **Journal Cover.**

26. Green, C. M.; Hastman, D. A.; **Mathur, D.**; Susumu, K.; Oh, E.; Medintz, I. L.; Díaz, S. A., *Direct and Efficient Conjugation of Quantum Dots to DNA Nanostructures with Peptide-PNA*. **ACS Nano** 2021, **15** (5), 9101-9110. IF: 15.88.

27. **Mathur, D.**; Kim, Y. C.; Díaz, S. A.; Cunningham, P. D.; Rolczynski, B. S.; Ancona, M. G.; Medintz, I. L.; Melinger, J. S., *Can a DNA Origami Structure Constrain the Position and Orientation of an Attached Dye Molecule?* **The Journal of Physical Chemistry C** 2021, **125** (2), 1509-1522. IF: 4.1. **Journal Cover**.

28. Hastman, D. A.; Melinger, J. S.; Aragones, G. L.; Cunningham, P. D.; Chiriboga, M.; Salvato, Z. J.; Salvato, T. M.; Brown, C. W., 3rd; **Mathur, D.**; Medintz, I. L.; Díaz, S.A., *Femtosecond Laser Pulse Excitation of DNA-Labeled Gold Nanoparticles: Establishing a Quantitative Local Nanothermometer for Biological Applications*. **ACS Nano** 2020, **14** (7), 8570-8583. IF: 15.88.

29. Mazuski, R. J.; Díaz, S. A.; Wood, R. E.; Lloyd, L. T.; Klein, W. P.; **Mathur, D.**; Melinger, J. S.; Engel, G. S.; Medintz, I. L., *Ultrafast Excitation Transfer in Cy5 DNA Photonic Wires Displays Dye Conjugation and Excitation Energy Dependency*. **The Journal of Physical Chemistry Letters** 2020, **11** (10), 4163-4172. IF: 6.71.

30. Brintlinger, T. H.; Buckhout-White, S.; Bassim, N. D.; **Mathur, D.**; Samanta, A.; Robinson, J. T.; Idrobo, J.-C.; Stroud, R. M.; Goldman, E. R.; Ancona, M. G., *Chemical Mapping of Unstained DNA Origami Using STEM/EDS and Graphene Supports*. **ACS Applied Nano Materials** 2020, **3** (2), 1123-1130. IF: 3.9.

31. Green, C. M.; **Mathur, D.**; Medintz, I. L., *Understanding the Fate of DNA Nanostructures inside the Cell*. **The Journal of Materials Chemistry B** 2020, **8** (29), 6170-6178. IF: 5.0. **Journal Cover**.

32. **Mathur, D.**; Klein, W. P.; Chiriboga, M.; Bui, H.; Oh, E.; Nita, R.; Naciri, J.; Johns, P.; Fontana, J.; Díaz, S. A., et al., *Analyzing Fidelity and Reproducibility of DNA Templated Plasmonic Nanostructures*. **Nanoscale** 2019, **11** (43), 20693-20706. IF: 6.8.

33. **Mathur, D.**; Medintz, I. L., *The Growing Development of DNA Nanostructures for Potential Healthcare-Related Applications*. **Advanced Healthcare Materials** 2019, **8** (9), e1801546. IF: 7.3. **Journal Cover.**

34. Cunningham, P. D.; Kim, Y. C.; Díaz, S. A.; Buckhout-White, S.; **Mathur, D.**; Medintz, I. L.; Melinger, J. S., *Optical Properties of Vibronically Coupled Cy3 Dimers on DNA Scaffolds*. **The Journal of Physical Chemistry B** 2018, **122** (19), 5020-5029. IF: 2.8.

35. Toeppa, A.J.; Schauta, R.G.; Scotta, B.D.; **Mathur, D.**; Berens, A.J.; Petersen, C.A., *Leishmania Incidence and Prevalence in U.S. Hunting Hounds Maintained via Vertical Transmission*. **Veterinary Parasitology: Regional Studies and Reports** 2017, **10**, 75-81. IF: 1.73.

36. **Mathur, D.**; Samanta, A.; Oh, E.; Díaz, S. A.; Susumu, K.; Ancona, M. G.; Medintz, I. L., *Quantum Dot Encapsulation Using a Peptide-Modified Tetrahedral DNA Cage*. **Chemistry of Materials** 2017, **29** (14), 5762-5766. IF: 9.5.

37. **Mathur, D.**; Medintz, I. L., *Analyzing DNA Nanotechnology: A Call to Arms for the Analytical Chemistry Community*. **Analytical Chemistry** 2017, **89** (5), 2646-2663. IF: 6.7. **Journal Cover**.

38. **Mathur, D.**; Henderson, E. R., *Programmable DNA Nanosystem for Molecular Interrogation*. **Scientific Reports** 2016, **6**, 27413. IF: 3.9.

39. **Mathur, D.**; Henderson, E. R., *Complex DNA Nanostructures from Oligonucleotide Ensembles*. **ACS Synthetic Biology** 2012, **2** (4), 180 - 185. IF: 5.5.

Proceedings

1. **Mathur, D.**, Kim, Y.C., Díaz, S. A., Ellis, G. A., Cunningham, P. D., Rolczynski, B. S., Ancona, M. G., Medintz, I. L., and Melinger, J. S.. 2021. *Exploring the Holliday Junction in a DNA nanostructure for creating excitonic dimers*. In **2021 IEEE 21st International Conference on Nanotechnology** (NANO). 360-363.

2. Green, C.M., Hastman, D. A., **Mathur, D.**, Susumu, K., Medintz, I. L., and Díaz, S. A. 2021. *Parameters guiding the self-assembly of quantum dots and DNA origami by peptide-PNA*. In **2021 IEEE 21st International Conference on Nanotechnology** (NANO). 448-450.

3. **Mathur, D.**; Klein, W.P.; Bui, H.; Oh, E.; Naciri, J.; Fontana, J.; Díaz, S.A.; Medintz, I.L., *Competitive Binding of Golf Nanospheres and Nanorods on DNA Origami Substrates*. **Colloidal Nanoparticles for Biomedical Applications**, XV 11255, 1125509.

4. Koehler, C.; **Mathur, D.**; Henderson, E.; Lutz, R., *Probing the Security of DNA Origami*. **2018 IEEE International Symposium on Software Reliability Engineering Workshops** 2018, 138-139.

5. Tun, T.T.; Lutz, R.; Nakayama, B.; Yu, Y.; **Mathur, D.**; Nuseibeh, B., *The Role of Environmental Assumptions in Failures of DNA Nanosystems*. **2015 IEEE/ACM International Workshop on Complex Faults and Failures in Large Software Systems** 2015, 27-33.

6. Ellis, S. J.; Henderson, E. R.; Klinge, T. H.; Lathrop, J. I.; Lutz, J. H.; Lutz, R. R.; **Mathur, D.**; Miner, A. S. *Automated Requirements Analysis for a Molecular Watchdog Timer*, **Proceedings of the 29th ACM/IEEE international conference on Automated software engineering**, ACM: 2014; pp 767-778.

7. Lutz, R. R.; Lutz, J. H.; Lathrop, J. I.; Klinge, T. H.; **Mathur, D.**; Stull, D. M.; Bergquist, T. G.; Henderson, E. R. *Requirements Analysis for a Product Family of DNA Nanodevices*, 2012 **20th IEEE International Requirements Engineering Conference (RE)**, IEEE: 2012; pp 211-220.

8. Lutz, R.; Lutz, J.; Lathrop, J.; Klinge, T.; Henderson, E.; **Mathur, D.**; Sheasha, D.A., *Engineering and Verifying Requirements for Programmable Self-Assembling Nanomachines*. **34th IEEE International Conference on Software Engineering** 2012, 1361-1364.

Book Chapters

1. Green, C.M., **Mathur, D.**, Susumu, K., Oh, E., Medintz, I.L., Diaz, S.A., 2022, *Polyhistidine-Tag-Enabled Conjugation of Quantum Dots and Enzymes to DNA Nanostructures*, **Bioluminescence, Springer Nature.**

Patent Applications

1. Díaz, S.A., Green, C.M., Spangler, J.R., **Mathur, D.**, Susumu, K., Stenger, D.A., Medintz, I.L., 5/30/2024, *Quantum Dot-Nucleotide Based Ratiometric Fluorescent Molecular Beacon for Quantitative CRISPR/Cas Activity Detection*, US Patent App. 18/346,973.

2. Walper, S.A., Medintz, I.L., **Mathur, D.**, Díaz, S.A., Thakur, M., Susumu, K., Stewart, M.H., 2/22/2024, *Quantum Dot-Peptide PNA-DNA Complexes as a Platform Reporter System for Multiplexed Detection in Cell-Free Transcription Translation-Based Biosensors*, US Patent App. 18/203,189.

3. Medintz, I.L., Melinger, J., Knowlton, W.B., Yurke, B., Susumu, K., Lee, S.H., Meares, A., **Mathur, D.**, Mass, O.A., Lee, J., Pensack, R.D., 8/10/2023, *Indodicarbocyanine Phosphoramidites with Bathochromically Shifted Absorption and Emission, and Tunable Hydrophobicity*, US Patent App. 18/160,925.

Honors & Awards

1. 2025 College of Arts and Sciences Proposal Writing Fellow.

2. 2025 John S. Diekhoff Award For Excellence in Graduate Mentoring.

3. 2024 Recommended for the NSF CAREER Award.

4. 2024 Nominated for the CWRU John S. Diekhoff Award For Excellence in Graduate Teaching and Mentoring.

5. 2024 ACS Division of Biochemistry and Chemical Biology Rising Stars.

6. 2023 *Scialog Fellow - Advanced Bioimaging*, by Research Corporation for Science Advancement.

7. 2021 NIH Pathway to Independence award.

8. 2015 The James Cornette Travel Award, Bioinformatics & Computational Biology Program, Iowa State University.

9. 2014, 2012 The James Cornette Research Fellowship ($4000 summer support), Bioinformatics & Computational Biology Program, Iowa State University.

10. 2014 Best student seminar, Bioinformatics & Computational Biology Program, Iowa State University.

Outreach Service

1. Judge, **Hathaway Brown Science Research & Engineering Program (SREP)**, March 4, 2025.

2. Judge, **Northeastern Ohio Science & Engineering Fair (NEOSEF)**, March 12, 2024.

3. Judge, **Hathaway Brown Science Research & Engineering Program (SREP)**, March 5, 2024.

4. Secretary, ACS Cleveland Section, 2024, 2025.

5. *Nobel Prize Series: Chemistry Lecture*, **Siegal Lifelong Learning Program**, Cleveland, OH, USA, 2023.

6. Guest lecturer, *Naval Research Enterprise Internship Program*, **The American Society for Engineering Education**, 2020, 2021.

7. **NSF** Panelist, *Emerging Researchers National Conference* 2018.

Teaching & Mentoring Experience

1. Instructor, Spring 2024, 2025 CHEM 330/430 **Bioconjugate Chemistry** (11-19 students).

2. Volunteer Instructor, 1 lecture Fall 2023, 2024 CHEM 605 **Graduate Professional Development** (20-30 students).

3. Instructor, Fall 2022, 2023, 2024 CHEM 304 **Quantitative Analysis Laboratory** 3 sections (48-60 students).

4. Graduate Teaching Assistant, Human Anatomy (GDCB255L) & Physiology (GDCB256L) laboratories, Iowa State University, 2014-2015; Average instructor rating = 4.6/5.

5. Advising Mentoring activity (*co-authored publications.)

Nicole Rashidi	Highschool Junior	Hawken High School	2025
Aysha Bente Akbor	Graduate student (PhD)	Case Western Reserve Univ.	2024-
Christie Lanfear	Undergraduate Senior	Case Western Reserve Univ.	2024-25
Vivian Qi	Highschool Junior	Hathaway Brown School	2024-
Isaiah Gilbert	Highschool Junior	University School	2023
Kelsey Knight	Highschool Junior	Hawken School	2023
Abhinav Kalhan	Undergraduate Junior	Case Western Reserve Univ.	2023-24
Sara Desai*	Undergraduate Freshman	Case Western Reserve Univ.	2023-
Era Srivastava*	Undergraduate Freshman	Case Western Reserve Univ.	2023-25
Anshul Nayak	Undergraduate Freshman	Case Western Reserve Univ.	2023-
Heather Everson*	Graduate student (PhD)	Case Western Reserve Univ.	2022-
Angelica Galvan*	Graduate student (PhD)	University of Maryland	2022-24
Kayla Neyra*	Graduate student (PhD)	Case Western Reserve Univ.	2022-
Puja Bhavsar	Highschool Senior	International Academy East	2022-23
Kevin Liu*	Undergraduate Senior	Case Western Reserve Univ.	2022-25
Jameel Kelley	Graduate student (Masters)	Iowa State University	2021-22
Katherin Rogers*	Graduate student (PhD)	University of Maryland	2020-22
Matthew Chiriboga*	Graduate student (PhD)	George Mason University	2018-22

David Hastman*	Graduate student (PhD)	University of Maryland	2018-21
Yeonwoo Kim	Highschool Senior	Thomas Jefferson High School	2018
Chase Koehler*	Undergraduate Junior	Iowa State University	2015-16
Gabrielle Ortman	Undergraduate Junior	Iowa State University	2015-16
Brian Nakayama*	Graduate student (Masters)	Iowa State University	2014-15
Michael McKinney	Undergraduate Sophomore	Denison University	2013

Review & Editorial Activities

1. 2025, NSF TIP/IP directorate *ad hoc* Reviewer.
2. 2025, CWRU DEI Awards Program *ad hoc* Reviewer.
3. 2025, Dutch Research Council (NWO) Veni Talent Program *ad hoc* Reviewer.
4. 2025 *Nano Letters* Early Career Board Member.
5. 2024 Reviewer (1 panel), NSF CBET division, Nanoscale Interactions Program.
6. 2022, 2024 NSF Graduate Research Fellowship Program (GRFP) reviewer.
7. 2023, 2024 Reviewer (3 panels), NSF TIP/IP directorate.
8. **Mathur, D.*** *Powering a DNA origami nanoengine with chemical fuel.* **Nature Nanotechnology** 2023, DOI: 10.1038/s41565-023-01573-2. IF: 38.3. **Invited News and Views.**
9. 2023 Reviewer special emphasis panel NIH "Nucleic Acid Therapeutic Delivery" ZRG1 BBBT.
10. 2023 Early Career Reviewer (ECR) NIH "Innovations in Nanosystems and Nanotechnology" INN Study Section.
11. 2022 DBT/Wellcome Trust India Alliance *ad hoc* Reviewer.
12. *Ad hoc* reviewer for 20 manuscripts since joining CWRU in journals including
    (a) AAAS *Science*
    (b) ACS *Applied Materials & Interfaces*, *Chemical Biology*, *Applied Nano Materials*, *Analytical Chemistry*, *Nano Letters*
    (c) Wiley *Particle & Particle Systems Characterization*, *ChemPlusChem*, *ChemistrySelect*, *Small*
    (d) RSC *Chemical Science*, *The Journal of Materials Chemistry B*, *Nanoscale*, *Physical Chemistry Chemical Physics*, *ChemComm*
    (e) Elsevier *Biomembranes*, *Journal of Photochemistry & Photobiology, A: Chemistry*, *Chemical Physics*
    (f) Springer *Silicon*
    (g) Springer Nature *Nature Nanotechnology, Scientific Reports*
    (h) Cell Press *iScience*
    (i) Other referee activities include AIP, book proposals, university grants, etc.
13. 2017 Reviewer (1 panel) NSF EFRI.
14. 2015 Graduate Student Representative for faculty search committee, *Physical Biology of the Cell*.

Conference & Seminar Activities

1. Conference & Symposium Organization:
   - Co-Chair, Symposium titled, *Nanoscale tools to understand the physical biology of the cell*, **American Chemical Society Fall 2025**, Washington DC, USA.
   - Session Chair, *Biomedical Applications of Plasmonic Nanoparticles II*, **SPIE Photonics West**, San Francisco, CA, USA, 2020.
   - Co-organizer, **the Mid-Atlantic DNA Nanotechnology Symposium**, National Institutes of Standards and Technology, Gaithersberg, MD USA, 2017, 2019, & 2022.

2. Invited oral presentations:
   - **2025 AVS Ohio Meeting, the Ohio State University,** Columbus, OH, USA, 2025.
   - **The Aqueous Supramolecular Chemistry Workshop, Montana State University,** Bozeman, MT, USA, 2025.
   - **Department of Chemical and Biomolecular Engineering, Case Western Reserve University,** Cleveland, OH, USA, 2025.
   - **Department of Chemistry, John Carroll University,** Cleveland, OH, USA, 2025.
   - **Department of Pharmacology, Case Western Reserve University,** Cleveland, OH, USA, 2025.
   - *Synthetic DNA Nanostructures as Platforms for Precise Nanoparticle Organization*, **Department of Physics, Kent State University,** Kent, OH, USA, 2025.
   - *Cytosolic stability of DNA nanostructures,* Mid-West Regional Meeting of the **American Chemical Society**, Crieghton University, Omaha, NE, USA, 2024.
   - *Synthetic DNA Nanotechnology: Reprogramming a Familiar Molecule,* **Department of Undergraduate Programs, Thomas Jefferson University,** Philadelphia, PA, USA, 2024.
   - *Synthetic DNA Nanotechnology: Reprogramming a Familiar Molecule,* **Department of Physics REU Seminar Series, Cleveland State University,** Cleveland, OH, USA, 2024.
   - **International Conference on Metamaterials, Photonic Crystals, and Plasmonics (META)**, Toyama, Japan, 2024. Declined due to visa related issues.
   - *Synthetic DNA Nanotechnology: Reprogramming a Familiar Molecule,* **Department of Chemistry Seminar Series, Cleveland State University,** Cleveland, OH, USA, 2024.
   - *Synthetic DNA Nanostructures as Platforms for Precise Nanoparticle Organization*, **American Physical Society** Eastern Great Lakes Section Northern Ohio Section of the AAPT, Cleveland, OH, USA, 2023.
   - *Synthetic DNA Nanostructures as Platforms for Precise Nanoparticle Organization*, Case Western Reserve University **Macromolecular Science and Engineering Department Colloquium**, Cleveland, OH, USA, 2023.
   - **International Conference on Metamaterials, Photonic Crystals, and Plasmonics (META)**, Paris, France, 2023. Declined due to visa related issues.
   - *Synthetic DNA Nanotechnology: Reprogramming a Familiar Molecule*, North Carolina State University **Tissue Engineering Group**, Virtual, 2023.
   - **3rd International Conference on Nanomaterials in Biology**, IIT Gandhinagar, India, 2023. Declined due to visa related issues.
   - *Synthetic DNA Nanostructures as Platforms for Precise Nanoparticle Organization*, Case Western Reserve University **Biophysics Colloquium**, Cleveland, OH, USA, 2022.
   - *Synthetic DNA Nanotechnology: Reprogramming a Familiar Molecule*, Case Western Reserve University **Dept of Biomedical Engineering**, Cleveland, OH, USA, 2022.
   - *DNA Origami*, **CWRU Origins Science Scholars Program**, Case Western Reserve University (in-person), Cleveland, OH, USA, 2022.
   - *The cytosolic stability of DNA nanostructures*, **Global Nanobiotechnology Consortium**, University of

South Florida (virtual & in-person), FL, USA, 2022.
- *Synthetic DNA Nanostructures as Platforms for Precise Nanoparticle Organization*, **Case Western Reserve University Dept of Chemistry**, Cleveland, OH, USA, 2021.
- *Can a DNA nanostructure constrain the position and orientation of an attached dye molecule?*, **Laboratory for Molecular Programing**, Iowa State University, IA, USA, 2021.
- *Enzyme-controlled release of QD in a DNA icosahedron*, **SPIE Photonics West Conference**, San Francisco, CA, USA, 2020.
- *DNA self-assembly: A nanoscale building block for bottom-up fabrication*, **George Mason University Department of Physics**, Fairfax, VA, USA, 2018.
- *DNA Nanotechnology: The Programmable Building Block of Life*, **Simpson College**, Indianola, IA, 2014.

3. Contributed oral presentations:
   - *Cytosolic stability of DNA nanostructures*, **American Chemical Society Spring 2024 Conference**, New Orleans, LA, USA, 2024.
   - *Behavior of DNA Nanostructures inside the cell cytosol*, **2023 Foundations of Nanosciences Conference**, Snowbird, UT, USA, 2023.
   - *Identifying the cytosolic fate of DNA nanostructures*, **2021 TechConnect World**, National Harbor, MD, USA, 2021.
   - *Multiplexed Biosensing with Quantum Dots and Cell-Free Systems*, **Engineering and Utilizing Biological Sensors in the CASBAH: current efforts and future directions**, Virtual, 2021.
   - *Can a DNA nanostructure constrain the position and orientation of an attached dye molecule?*, **The 21st IEEE International Conference on Nanotechnology**, 2021.

4. Contributed poster presentations (limited to presenting author posters since postdoc):
   - Mathur, D.; Galvan, A.R.; Green, C.M.; Hooe, S.L.; Oktay, E.; Thakur, M.; Díaz S.A.; Veneziano, R.; Medintz, I.L., *Cell free protein expression from a gene-encoded DNA nanoparticle* In **DNA 30**, Baltimore, MD, 2024.
   - Mathur, D.; Kim, Y. C.; Díaz, S. A.; Cunningham, P. D.; Rolczynski, B. S.; Ancona, M. A.; Medintz, I. L.; Melinger, J. S., *Can a DNA Nanostructure Constrain the Position and Orientation of an Attached Dye Molecule?* In **Foundations of Nanosciences**, Virtual, 2021.
   - Mathur, D.; Muroski, M.; Díaz, S. A.; Klein, W.; Field, L.; Delehanty, J. B.; Medintz, I. L., *The Physiological Fate of DNA Crosshairs in the Cell Cytosol*. In **Mid-Atlantic DNA Nanotechnology** (MADNano), 2019.
   - Mathur, D.; Samanta, A.; Oh, E.; Díaz, S. A.; Susumu, K.; Ancona, M. A.; Medintz, I. L., *Quantum Dot Encapsulation Using a Peptide-Modified Tetrahedral DNA Cage*. In **Foundations of Nanosciences**, Snowbird, Utah, USA, 2017.
   - Mathur, D.; Buckhout-White, S.; Person, C.; Chapin, A. A.; Goldman, E.; Medintz, I. L., *Coding DNA Restriction into Dynamic Nanosystems: Merging Molecular Logic with Synthetic Biology*. In **DNA23**, Austin, Texas, USA, 2017.