

Tiffany R. Olivera

Ph.D. Candidate in Chemistry

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Education

Rutgers University

Graduate School – School of Arts & Sciences

- Ph.D. Candidate in Chemistry
- Principle Investigator: Dr. Fei Zhang

Newark, NJ
May 2026

New Jersey Institute of Technology

College of Science and Liberal Arts

- B.S. in Chemistry
- Principle Investigator: Dr. Farnaz A. Shakib

Newark, NJ
May 2020

New Jersey Institute of Technology

College of Science and Liberal Arts

- B.S. in Biology, Minor in Applied Mathematics
- Principle Investigator: Dr. Cristiano L. Dias

Newark, NJ
May 2020

Laboratory Skills

- Experimental: Gel Electrophoresis, Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), DNA and RNA Extraction, Purification, Spectrophotometer, PCR, Chromatography, 3D Printer
- Computational: CaDNAno, Tiamat, ImageLab, Linux, LaTeX, Python, CP2K, GROMACS, Xmgrace, Spartan, Avogadro, VMD, Gaussview, Vesta, MATLAB, Microsoft Office

Research Experience

Graduate Research Assistant

Newark, NJ

Rutgers University – Newark Department of Chemistry

Summer 2021 – Present

- Member of Dr. Fei Zhang's [Biomolecular Design research group](#) as a doctoral student researcher.
- Trained in software design techniques using CaDNAno and Tiamat, which aid in designing and creating both DNA and RNA structures.
- Wet lab work trained on Gel Electrophoresis, i.e. Denaturing PAGE gels, Agarose gels, and Native gels.
- Trained on the Atomic Force Microscope (AFM) regarding imaging nanostructure samples.
- **Project 1:** Dynamic DNA Origami Nanoclock. Novelty included in this first design: dynamic in nature due to Holliday Junction for the clock's arm and single strand displacement reactions between the clock's arm and about the ring; curvature in the ring; angle control and movement; and unique structural concept pertinent to real world applications.
- **Project 2:** Biomineralization of DNA Origami. Novelty included in this design: DNA origami acting as a templated structure; various nanomaterials on the surface by chemical reactions; nanopatterning.

Research Assistant

Newark, NJ

NJIT Department of Chemistry and Environmental Science

Summer 2020

- Performed literature review on the following computational methods: *Mixed Quantum-Classical Liouville* (MQCL), *Ring Polymer Surface Hopping* (RPSH), and *Quasi-Diabatic* (QD) Scheme.

Undergraduate Research Assistant

Newark, NJ

NJIT Department of Chemistry and Environmental Science

Spring 2020

- Project: Atomistic View of Mercury Cycling over Defected Salt Formations
- Once elemental mercury Hg(II) is photochemically oxidized in the atmosphere, the key chemical form is produced. The inadequate knowledge of the surface chemistry of Hg(II) hinders the evaluation of its deposition into the environment.
- This project aimed to elucidate the rate and mechanism of Hg(II) removal by environmental surfaces. Periodic boundary calculations at the level of density functional theory was used to study binding of different Hg(II) compounds on the surface of a series of crystalline material.

- Project: Designing Amyloid-Inspired β -Sheet Fibrils from Left- and Right-Handed Peptides
- Amphipathic peptides are comprised of alternating polar and nonpolar amino acids that tend to self-assemble into amyloid-like fibril structures. The translation machinery for protein synthesis evolved to utilize the left-handed chiral form of amino acids.
- Designed simulation systems to compare atomic structures of self-assembling monomers and amyloid forming peptides with GROMACS. These peptides were found to coassemble into fibrils alternating in L- and D-peptides that orient in a rippled β -Sheet structure.

Publications

1. Lee, J., Yang, Q., Chang, X., Perumal, D., Jeziorek, M., **Olivera, T. R.**, Echegaray, J., Zhang, F. "Self-assembly of DNA Parallel Double-Crossover Motifs" *Nanoscale*, **2024**, Manuscript accepted.
2. Lee, J., Yang, Q., Chang, X., Wisnewski, H., **Olivera, T. R.**, Saji, M., Kim, S., Perumal, D., Zhang, F. "Nucleic acid paranemic structures: a promising building block for functional nanomaterials in biomedical and biotechnological applications" *J. Mater. Chem. B*, **2022**, <https://doi.org/10.1039/D2TB00605G>.
3. Yang, Q., Chang, X., Lee, J., **Olivera, T. R.**, Saji, M., Wisnewski, H., Kim, S., Zhang, F. "Recent Advances in Self-Assembled DNA Nanostructures for Bioimaging" *ACS Appl. Bio Mater.* **2022**, <https://doi.org/10.1021/acsabm.2c00128>.

Presentations

1. **Olivera, T. R.**, Zhang, F., "Dynamic DNA Origami Nanoclock" **Poster presented** at Research Week hosted by the Rutgers University – Newark Research Conference (2023).
2. **Olivera, T. R.**, Zhang, F., "Dynamic DNA Origami Nanoclock" **Published abstract** in the Book of Abstracts (2023).
3. **Olivera, T. R.**, Zhang, F., "Dynamic DNA Origami Nanoclock" **Poster presented** at the National Diversity in STEM (NDiSTEM) hosted by the Society for the Advancement of Chicanos/Hispanics and Native Americans in STEM (SACNAS) Research Conference (2022).
4. **Olivera, T. R.**, Zhang, F., "Dynamic DNA Origami Nanoclock" **Published abstract** on page 34 in [SACNAS Book of Abstracts](#) (2022).
5. **Olivera, T. R.**, "Brief Introduction into Proton-Coupled Electron Transfer and Mixed Quantum-Classical Methods" **Guest Lecture Presented** to Maitra Group (2021).
6. **Olivera, T. R.**, Dias, C. L., "Designing Amyloid-Inspired β -Sheet Fibrils from L- and D-Handed Peptides" **Published abstract** on page 119 in [NJIT Book of Abstracts](#) (2019).
7. **Olivera, T. R.**, "Designing Amyloid-Inspired β -Sheet Fibrils from L- and D-Handed Peptides" **Poster presented** at NJIT Twelfth International Undergraduate Summer Research Symposium (2019).

Teaching Experience

Teaching Assistant

Newark, NJ

Rutgers University – Newark

Fall 2022 – Spring 2023

- Taught as a Lab Instructor for two General Chemistry Lab sections each semester, where I demonstrated lab procedures, supervised, and helped students perform the experiments while offering office hours. During the semester, attendance and participation was required for weekly lab trainings as well.
- Additionally, responsibilities included proctoring and grading for two General Chemistry Lecture courses.

STEM Tutor

Newark, NJ

Dolores Turco Foundation

Fall 2021 – Spring 2023

- Tutors Barringer High School students in grades 9-12th in subjects ranging from math and science to history and literature. Assists in college application submissions and writing college entrance essays.
- Tracks academic performance and accomplishments during sessions to assess learning deficiencies and strengths to personalize instructional plans and promote critical thinking, analysis, and reasoning.

English as a Second Language (ESL) Instructor Newark, NJ

Dolores Turco Foundation

Spring 2022

- Co-Hosted a weekly night ESL adult course at Barringer High School for family members of the students. Created a curriculum and lesson plans for different levels of proficiency of English.
- Kept records of progress and work accomplished during the course to detect weaknesses to focus on for the next session. Provided feedback and encouragement on all take-home assignments.

Mathematics Instructor

Montclair, NJ

Mathnasium of Montclair

Fall 2017 – Summer 2020

- Instructed students K-12, SAT/ACT/Praxis preparation by implementing the Mathnasium Method.
- Proctored assessments to ascertain learning deficiencies and strengths to customize instructional plans and use a variety of teaching techniques to encourage critical thinking and discussion.

Graduate Coursework: Completed

- Advanced Biochemistry, Crystal & Molecular Structures, Hybrid Biomaterials, Biomolecular Designing
- Main Metal Group Chemistry, Analytical Spectroscopy, Special Topics in Inorganic Chemistry
- Classical Mechanics, Statistical Mechanics

Volunteer Experience

- Kearny Department of Health **Board Member 2023-present**
- Rutgers – New Brunswick **Student Panel Member 2022** for local LSAMP STEM Research Panel
- **Science Fair Judge** for the Fair for Emerging Researchers (FER) **Spring 2022** Annual Science Fair
- B2D Grad **Student Panel Member 2022** for Thirteenth Annual LSAMP STEM Research Conference
- **Chemistry Demonstrator** for **2022** for Rutgers University/Bristol Meyers Squib Middle School Program
- B2D Grad **Student Panel Member 2021** for Twelfth Annual LSAMP STEM Research Conference
- **Assistant Coordinator** for **First Annual 2019** NJIT Chemistry Olympics
- **Chemistry Demonstrator** for **2017-2019**, and **Judge** for **2022** Chem Expo at Liberty Science Center

Awards & Distinctions

- **NIH Graduate Research Training Initiative for Student Enhancement (G-RISE) Grant Recipient 2023-24**
- **Accorded Ford Foundation Fellowship – Honorable Mention 2023**
- Recipient of the Great Minds in STEM (GMiS) Scholarship 2022
- Recipient of the NSF Bridge to Doctorate (B2D) Fellowship 2020-22
- Fall 2019 & Spring 2020 Dean's List Recipient
- Recipient of 2015-18 NJIT Faculty Scholarship
- Recipient of 2015 EOP Mobile Engineers Scholarship
- Recipient of the 2015 Foster, F. Gordon Scholarship

Certifications

- Completion of Rutgers Biosafety/Bloodborne Pathogens Training
- Completion of Rutgers Laboratory Safety Training

Organizations

- RU-N **Graduate Student Governing Association** (GSGA) Senator **Spring 2022 – Present**
- North Jersey ACS **Younger Chemists Committee** (YCC) Co-Chair **Spring 2022 – Present**
- RU-N **NSF-B2D** Fellow **Fall 2020 – Spring 2022**
- **American Chemical Society** NJIT Chapter Secretary **Fall 2018 – Spring 2020**

Affiliations

- **North Jersey American Chemical Society** (NJACS) Member **Fall 2021 – Present**
- RU-N **Graduate Chemistry Club** Member **Fall 2021 – Present**
- **National American Chemical Society** (ACS) Member **Spring 2020 – Present**
- NJIT **GS-LSAMP** Member **Spring 2020**
- NJIT **Educational Opportunity Program** Member **Summer 2015 – Spring 2020**