

Tiffany R. Olivera

Ph.D. Graduate Student in Chemistry

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Education

Rutgers University – Newark

Graduate School – Newark

- Ph.D. Graduate Student 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 Microscope (AFM), DNA and RNA Extraction, Purification, Spectrophotometer, PCR, Chromatography, 3D Ultimaker 3 Printer
- Computational: Linux, CaDNAno, Tiamat, ImageLab, LaTeX, Python, CP2K, GROMACS, Xmgrace, Spartan, Avogadro, VMD, Gaussview, Vesta, MATLAB, Microsoft Office

Graduate Coursework

- Completed: Classical Mechanics, Statistical Mechanics, Biochemistry, Crystal & Molecular Structures, Hybrid Biomaterials, Main Metal Group Chemistry
- In progress: Chemistry of Heterocyclic Compounds

Undergraduate Coursework

- Biochemistry & Lab, Inorganic Chemistry, Physical Chemistry I, II, & III & Lab, Instrumental Analysis, Organic Chemistry I, II & Lab, Analytical Chemistry & Lab, Material Science and Engineering
- Bioinformatics I & II, Intro to Biomedical Engineering, Microbiology, Molecular Biology, Cell Biology
- Classical Mechanics, Electrodynamics, Calculus I, II, & III, Differential Equations, Linear Algebra, Probability & Statistics, Intro to Partial Differential Equations, Mathematical Biology

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) being performed 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:** Inorganic Materials Functionalized onto a DNA Nanostructure. Currently performing literature review and creating the DNA structural design.

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.

Undergraduate Research Assistant

Newark, NJ

NJIT Department of Physics

Summer 2019

- 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 two simulation systems to compare atomic structures of self-assembling monomers and used high-performance computer applications to perform calculations to simulate amyloid forming peptides with GROMACS. After analyzing the data with Xmgrace and VMD, these peptides 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., 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>.
2. 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.**, "Dynamic DNA Origami Nanoclock" **Poster will be presented** at the Society for the Advancement of Chicanos/Hispanics and Native Americans in STEM (SACNAS) Research Conference (Oct. 2022).
2. **Olivera, T. R.**, "Brief Introduction into Proton-Coupled Electron Transfer and Mixed Quantum-Classical Methods" **Guest Lecture Presented** to Maitra Group (2021).
3. **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).
4. **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 – Present

- Teaching as a Lab Instructor for two General Chemistry Lab sections, where I demonstrate the lab procedure, supervise and help students perform the experiments, and offer office hours outside of lab time. During the semester, attendance and participation is required for weekly lab trainings as well.
- Additionally, I am proctoring and grading for a General Chemistry Lecture course.

STEM Tutor

Newark, NJ

Dolores Turco Foundation

Fall 2021 – Spring 2022

- Tutored Barringer High School students in grades 9-12th in subjects ranging from math and science to history and literature. Assisted in college application submissions and writing college entrance essays.
- Tracked 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.

Volunteer Experience

- 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
- 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, 2018, and 2019 Annual Chem Expo at Liberty Science Center
- **Event Supervisor** for 2018 Annual Science Olympiad hosted by NJIT

Awards & Distinctions

- Recipient of the Great Minds in STEM (GMiS) Scholarship 2022
- Recipient of the NSF Bridge to Doctorate (B2D) Fellowship 2020-2022
- Fall 2019 & Spring 2020 Dean's List Recipient
- Recipient of 2015-2018 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

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

Affiliations

- **North Jersey American Chemical Society** (NJACS) Member **Fall 2021 – Present**
- Rutgers-Newark **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**