

Nichole O'Neill, Ph.D. (2024)

Cell: (856)-332-6766 Email: Nichole.S.Oneill@gmail.com Website: <https://thecuriouschemist.blog/>

Skills

Infrared Spectroscopy, Vibrational Circular Dichroism Spectroscopy, Raman Spectroscopy, Ultraviolet Circular Dichroism Spectroscopy, Ultraviolet-visible Spectroscopy, Nuclear Magnetic Resonance, Dynamic Light Scattering, Small Amplitude Oscillatory Shear Rheology, Ultra-Performance Liquid Chromatography, Karl-Fischer Titration, Viscometry

Industry Experience

Realm Therapeutics, Research and Development

Research Assistant, Malvern, PA September 2017-September 2018

- Aided CMC team in the development and evaluation of testing methods (method development) for setting specification and acceptance criteria for raw materials (including API) according to the USP monograph. Analyzed, and communicated results in a written report.
- Worked closely with formulation chemist on proprietary ocular and dermal products to increase chemical stability. Matrix stability of the chemical formulation was investigated using a Design of Experiment approach.
- Primary researcher for production and manufacturing of drug products. Batches were prepared using temperature control (cold manufacturing) with the vehicle gel manufacturing required handling of industrial size mixers.
- Monitored the daily performance of lab and performed quality control testing of the API and raw materials. Daily characterization of research samples, raw materials, vehicles, and API included measurement of the pH, conductivity, density, concentration (iodometric titrations), and viscosity.
- Material studies included investigating packaging (e.g. vials, tubes, packets) and production equipment such as tubing and metals for manufacturing of API (e.g. pitting of different stainless-steel grades in the presence of API, integrity of fluorinated vs non-fluorinated tubing and their effects on API concentration, tubing material and size effects on API manufacturing).
- The AFC content was measured using Karl Fischer titration or iodometric titrations using a Mettler Toledo T50 or by hand (for higher concentrations). Viscosity measurements were carried out using a Brookfield DV-E Viscometer.
- Independent research was also conducted on published data and existing laboratories.

Chemistry Lab Technician (Internship), April 2017-September 2017

- Helped set-up the laboratory in the initial phase of start-up. Built SOPs and documents for testing methods and instrumentation.
- Worked within the R&D team to increase the stability of the products (ophthalmic and dermal) by implementing a Design of Experiments approach. Daily responsibilities included stability testing using Karl Fischer titration, record and report results in laboratory notebook in compliance with USP standards.

Research Experience

Alvarez Research Group, Soft Matter/Fluids Dynamic Laboratory

Graduate Research Fellow, Drexel University, April 2020-current

- Design, validate, and implement research experiments and material studies to probe the self-assembly and hydrogelation of aromatic tripeptides.
- Analyze prospective candidates for hydrophobic drug adsorption, measure drug loading capacities of gels using optical spectroscopy and UPLC chromatography.
- The bulk properties of the materials are characterized by small amplitude oscillatory shear rheology.

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- Weekly PowerPoint presentations are prepared to facilitate communication of results to advisors and our multidisciplinary team.
- Findings are published in peer-reviewed journals.

Schweitzer-Stenner Research Group, Biospectroscopy Laboratory

Graduate Researcher, Drexel University, April 2020-current

- Investigating the self-assembly and aggregation of tripeptides through spectroscopic techniques including but not limited to IR, VCD, Raman, UV-CD, UV/Vis, DLS
- Analyze nanostructures of fibrils using vibrational spectroscopy (FTIR, VCD, and Raman) and powder x-ray diffraction (PXRD).
- Crystal structures and fibril axes are validated using self-built vibrational spectra programs that simulate the structure sensitive amide I dispersion patterns using a floating oscillator model and transition dipole coupling calculations.
- Maintain lab space, regularly update chemical inventory, and work closely with Environmental Health and Safety to ensure the lab meets regulation standards.

Scepaniak Research Group, Inorganic Chemistry Laboratory

Graduate Research Fellow, Drexel University, August 2019-April 2020

- Strengthened synthetic techniques including Schlenk line and glovebox work. Primarily worked on azide-alkyne cycloadditions using a Cu (II) catalyst.
- Characterized metal complexes using proton NMR, solution state magnetic moment measurements, and cyclic voltammetry. Crystallization was also required to obtain single crystals for x-ray diffractometry.

Undergraduate Researcher, Drexel University, September 2018-June 2019

- Synthesized first-row transition metal complexes that had potential to act as paraCEST contrasting agents for MRI.
- Characterized metal complexes using proton NMR, solution state magnetic moment measurements, and cyclic voltammetry. Crystallization was also required to obtain single crystals for x-ray diffractometry.
- Performed stability studies towards biological relevant ions.

Peer Reviewed Publications (* indicates first author)

*Determining the Nanostructure and Main Axis of Gly-His-Gly Fibrils Using the Amide I' Bands in FTIR, VCD, and Raman Spectra***

Spectrochimica Acta Part A, October 2023

doi: [10.1016/j.saa.2023.123584](https://doi.org/10.1016/j.saa.2023.123584)

Conformational Manifold Sampled by Two Short Linear Motif Segments Probed by Circular Dichroism, Vibrational and NMR Spectroscopy

Biochemistry, August 2023

doi: [10.1021/acs.biochem.3c00212](https://doi.org/10.1021/acs.biochem.3c00212)

Influence of Central Sidechain on Self-Assembly of Glycine-x-Glycine Peptides

Soft Matter, November 2022

doi: [10.1039/D2SM01082H](https://doi.org/10.1039/D2SM01082H)

*Forbidden Secondary Structure Found in Gel-Forming Fibrils of Glycylphenylalanylglycine***

The Journal of Physical Chemistry B, October 2022

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doi: [10.1021/acs.jpcc.2c05010](https://doi.org/10.1021/acs.jpcc.2c05010)

Repeating Aspartic Acid Residues Prefer Turn-like Conformations in the Unfolded State: Implications for Early Protein Folding

The Journal of Physical Chemistry B, October 2021

doi: [10.1021/acs.jpcc.1c06472](https://doi.org/10.1021/acs.jpcc.1c06472)

Professional Workshops/Seminars

LC Separation Modes and Column Chemistries,
Waters Corporation, 2023

Acquity Advanced Polymer Chromatography
System Theory and Practical Applications, Waters
Corporation, 2023

Scientific Talks

Biophysical Society Annual Meeting, 2022
Biomaterials and Nanotechnology Platform
San Francisco, CA, USA

Drexel University Service Committees

Associate Dean for Graduate Education Search
Committee, *Dean Appointed Member*, 2023
College of Arts and Sciences

Diversity, Equity, Inclusion, and Belonging
Committee, *Graduate Student Representative*,
2023, *Chemistry Department*

International Conference Presentations

International Conference on Materials Chemistry,
2023, *Dublin, IE*
1) *Approaches to Material Design and Discovery*
2) *Materials for Life*

Vibrational Optical Activity Conference, 2022
Edmonton, AB, CA

Education

Ph.D. Physical Chemistry, Drexel University

February, 2024

B.S. Chemistry, Drexel University

June, 2019

Mathematics and Chemistry, Rowan College of South Jersey

September 2014 – June 2016