

Analytical Chemistry Seminar

Tuesday, March 19, 2024
3:30 p.m. ~ WTHR 320

"Fluorescent and Colorimetric Dual-Mode Carbon Dot-Based Sensors for Detection of Antibiotics"



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Abstract:

The emergence and spread of antibiotic-resistant bacteria has accelerated in recent decades due to the misuse and overuse of antibiotics in medicine, agriculture, and livestock farming. Although several traditional detection methods, such as Liquid/Gas Chromatography and Mass Spectrometry (MS), are highly effective in identifying antibiotic residues in food and water sources, an alternative technique that is rapid, sensitive, and user-friendly is necessary. A novel method that consists of using fluorescent and colorimetric dual-mode sensors comprised of carbon dots (CDs) offers a practical solution with the ability to visualize the presence of antibiotics, enabling prompt remediation actions. Through Förster resonance energy transfer (FRET), the proximity of an antibiotic near CDs quenches the emission fluorescence of CDs, signaling the presence of a specific class of antibiotics (such as tetracyclines and sulfonamides). CDs alone have gained significant attention in many different research areas for many years due to their diverse chemical properties, as they have great biocompatibility, distinctive optical properties, high stability and electron mobility. Since they are also eco-friendly and inexpensive, they become promising building blocks for sensors that have the potential to be harmlessly used for antibiotic detection in our food and water supplies. In this seminar, I will be introducing a couple of biosensors and their potential towards real world applications.

Bio:

Patrizia Polichetti is a second-year graduate student in the Garth Simpson Group. She graduated from the University of California - Davis in 2022 with a B.S. in ACS Chemistry. Her undergraduate research involved working in a Plant Pathology lab directed by Amisha Poret-Peterson, where she worked on identifying microbial communities, quantifying their concentration in soil, and measuring their nitrogen consumption. She also worked in an Astrochemistry lab directed by Dr. Kyle Crabtree, where she designed, constructed, and utilized a four-mass flow controller system for an existing pressurized gas cell used to generate and identify nitrogen-containing radicals that were characterized via chirped-pulse Fourier Transform microwave spectroscopy. In the Fall of 2022, she joined Dr. Garth Simpson's nonlinear optics lab where she is currently helping construct nonlinear optical instruments, as well as using computational methods for the classification of pharmaceutical agents.