

Materials Chemistry Seminar

Friday, February 2, 2024
11:30 a.m. ~ BRWN 4102

"Naturally Strong: Biobased Epoxy Adhesives for Underwater Use"

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Bio:

Isabelle is a second-year graduate student in the Wilker lab. She graduated from Mercer University in 2022 with a B.S. in Chemistry. Her undergraduate research was focused on the characterization of corrosion products for early corrosion signaling. In her free time, she enjoys video games, reading, and cooking.

Abstract:

Developing adhesives for underwater use is an ongoing struggle. Although nature has mastered the art, as seen in creatures like mussels and oysters, it is nearly impossible to recreate the exact protein deposits. This proves even more difficult when trying to do so economically. Mimicking the functionalities found in nature can produce materials that are comparable to current market standards. These adhesives are made through the incorporation of the catechol moiety in synthetic polymers, or by using naturally occurring compounds containing the catechol moiety, such as tannic acid.

Previously in our lab, we have created a thermoset adhesive derived only from biorenewable sources. The combination of epoxidized soybean oil (ESO), malic acid, and tannic acid meets or exceeds the strength of numerous commercial products when cured at elevated temperatures. The novelty in the current work is altering the properties of the thermoset to be easily applicable at ambient temperatures under artificial sea water, without the necessity of a secondary curing process. The ultimate goal is to be able to use the new system for a multitude of applications, including coral reef repair.