DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

Department of Materials Science and Engineering,

PhD Candidacy

Date & Time: Friday, February 5th from 1:00-3:00pm
Where: https://drexel.zoom.us/j/88645223817

Title: Bactericidal Polymeric Filtration Membranes

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Advisor: Dr. Caroline Schauer

Abstract: Waterborne diseases transmitted through contaminated drinking water is estimated to cause nearly 2 million deaths per year. A prominent challenge in water filtration is membrane fouling, which is when a solution or particle is deposited on a membrane surface or sticks in the pores, causing a reduction in flux and filtration quality. Moreover, biological fouling (biofouling), which is the deposition and buildup of bacteria and fungi on a membrane surface contributes to more than 45% of all membrane fouling. To limit biofouling, membrane surfaces can be modified *via* chemical coating, imprinting nano or micropatterns, or embedding or blending additives. Researchers have designed surfaces to inhibit the adhesion of bacteria, but over time bacteria will adhere and form biofilms. An alternative membrane modification to create bactericidal surfaces relies on embedding metallic nanoparticles onto the membrane surface or imprinting patterns which mimic certain naturally occurring bactericidal surfaces. Bactericidal surfaces kill any bacteria that adhere, thus eliminating the opportunity for biofilm formation and biofouling to occur. Inclusion of silver nanoparticles into a polymeric matrix effectively kills bacteria cells, but the nanoparticles are expensive, are an unrenewable resource, and a certain amount of leaching is unavoidable. Imprinting biomimetic bactericidal patterns onto surfaces is a developing field previously focusing on biomedical applications. Plus, certain patterns are hydrophobic, which would decrease flux and could impact other types of fouling in a water filtration setting. In this presentation

the material characterization and anti-biofouling ability of each of these techniques will be discussed.