

Biopolymer Membranes For Greywater Filtration Homa Keshmiri, Alexandra Lam, Christine Ogunsola, Amanda Schroeder, Melody Simmons Department of Chemical & Biomolecular Engineering, University of Maryland - College Park, MD

Introduction

Lightly contaminated wastewater from household activities like laundry and dishwashing can be efficiently reused for agriculture and irrigation through localized filtration systems without requiring excessive purification standards. Membranes are a leading technology in greywater treatment due to their compact design, low cost, and effectiveness in removing small solids and pathogens. However, current membranes rely on petrochemical materials and toxic solvents, raising environmental and health concerns.

Our project addresses these issues by **producing sustainable** CTA/Chitosan composite biopolymer flat sheet membranes using an environmentally friendly solvent called NMMO. This design targets sustainability, performance, and scalability.



Methods

Aspen Plus V14 Simulation Software was used to model all units, process streams and exchangers

Aspen Economic Analyzer estimated cost and utility requirements **Python** was used to code a proportional integral temperature controller

By Hand calculations were performed to model process optimization parameters, solubility requirements, and other complex system properties.

At an industrial scale, phase inversion is a continuous process where the polymer solution is poured onto a roll of support layer, immersed in a coagulation bath, and then rolled out of the bath as seen in Figure 2.







