Anti-Biofouling With 3D Printing
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Introduction

Data analysis over the last century confirms that although desalinization and filtration technology is vital for increasing freshwater resources, the U.S. has yet to invest in this untapped resource. Currently, biofouling (the accumulation of bacteria) is suspected to be a major factor in filtration clogging which breaks down current filtration systems. The Bioinspired Materials and Structures Lab seeks to design, fabricate, and test 3D printed membranes that make up the spacers within these filtration systems to find an ideal anti-biofouling structure.

Lab Activities

During the SHINE program, I cultured and studied the structure of Cobetia Marina Biofilm and its effects on filtration systems; designed, fabricated, and tested 3D membranes using various materials; and combined the two projects, growing biofilm on the 3D membranes to test its clogging effect and detachment rates.

1. Culturing Cobetia Marina Biofilm
   - Wrote 10 day Biofilm Manual with step by step instructions on how to grow and study Biofilm over a 2 week period.

2. Designing 3D Membranes with CAD software
   - Learned how to use SolidWorks
   - Designed personal structures with mentor guidance

3. Fabrication of 3D Membranes
   - Using 3D printer + creating curing solution
   - Creating various elastomer materials to fill in 3D membranes

Findings

1. The conditions where Biofilm can grow

2. That after 4 days, Biofilm decreased the rate of filtration by more than 55%

3. An ideal design for filtration feed spacers

Acknowledgements

I would like to thank Professor Qiming Wang for giving me the opportunity to participate in this lab as well as helping guide me through the research process; my lab mentor Yanhui Jiang for being an amazingly patient and intelligent teacher, constantly looking out for me; my SURE mentor Hau Truong and lab mate Rebecca Chen for including me in their project and teaching it to me step by step; Dr. Katie Mills for giving me this opportunity, Ian Andrade, and Tracy Charles.