Enhancement of solar stills through corrosion prevention and improved hydrophobic glass coatings

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Background

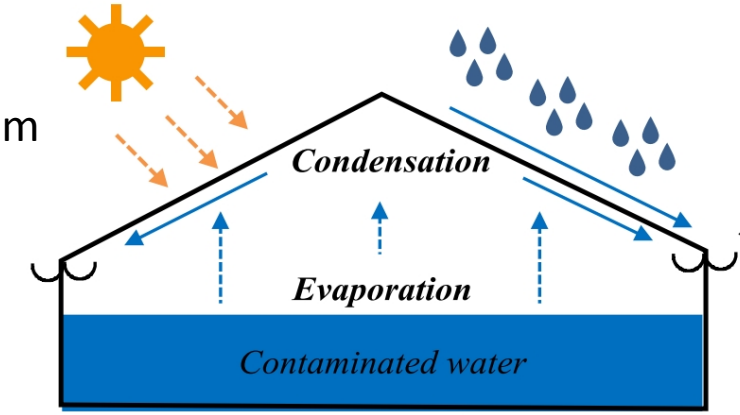
- Solar desalination utilizes the process of condensation and evaporation to purify water
- Solar stills utilizes solar desalination and are at risk to corrosion due to exposure to brackish water
- The glass top of a solar still condescends the evaporated water and transports it to distillate collection

Objectives

- Test efficiency of corrosion resistant aluminum etching
- Initiate the search for hydrophobic glass coatings to improve condensation collection efficiency

Methods

- A corrosion reactor was created by combing a simple distillation with a heating apparatus and an aluminum surface
  - Scanning electron microscope images were taken before and after boiling experiments in the corrosion reactor as well as elemental analysis of the aluminum surface
- Hydrophobic coating of TiO2 was tested on microscope slides
  - Measure of transparency and hydrophobicity were taken



Results

Corrosion reactor

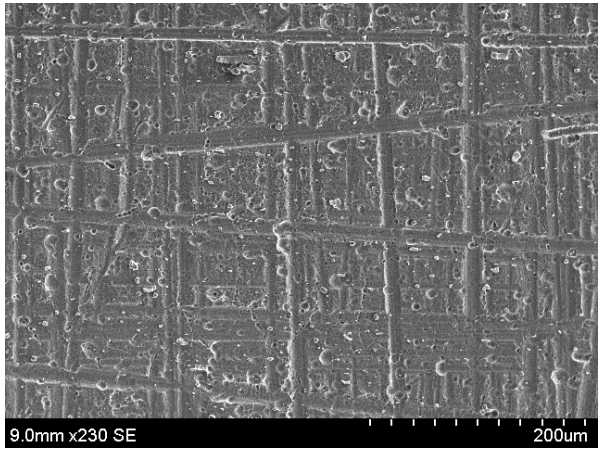
- Etched aluminum showed evidence of corrosion and scaling from SEM and elemental analysis but from observation the scaling is easily removed

Hydrophobic coating

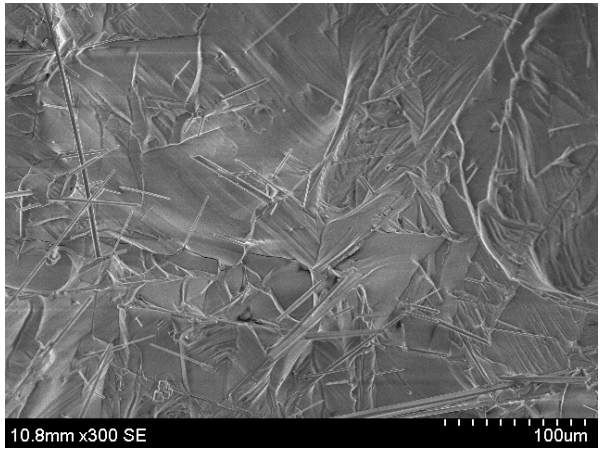
- The hydrophobic coating showed marginal improvement when compared to untreated glass

Concentration (M)	Contact angle (°)	Transparency
0.000	18.2	
0.003	22.1	97.90%
0.013	22.1	98.15%
0.028	21.7	97.08%
0.038	22.75	95.96%
0.050	19.33	96.66%
0.075	19.75	92.52%

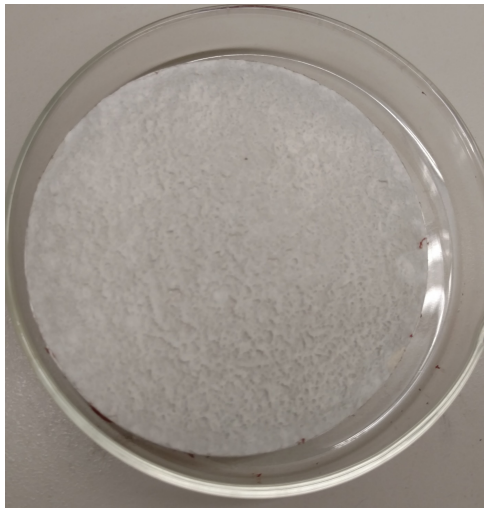
TiO_2 treated microscope slide samples



Etched aluminum with synthetic water before boiling



Etched aluminum with synthetic water after boiling



Polished aluminum with synthetic water before boiling

Etched aluminum with synthetic water before boiling

Future work

- Rerun experiments with other synthetic water components
- Rerun experiments over a longer period of time to test the etching integrity
- Recreate published experiments found during literature review to create superhydrophobic coatings