Team # 01

Water Desalination Using Carbon Nanotubes

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Customer Background

As fresh water scarcity worsens globally there is a pressing need for affordable, scalable, cost effective solutions. Current technologies are costly and limited in reach. Using carbon nanotubes can revolutionize current filtration issues.

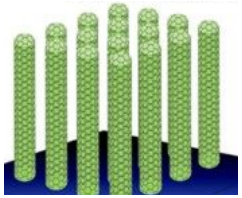
Problem Statement

The goal of this project is to develop an efficient, economical, and sustainable carbon nanotube water desalination filter meeting Purdue Research Foundation specs for salt removal and low-energy operation

Requirements

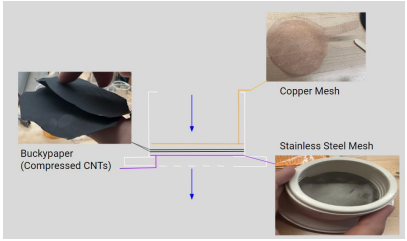
Req #	DESIGN REQUIREMENTS	METRICS
1	Use of vertically oriented carbon nanotubes	Water flow increase from alignment
2	Repeatable process for aligning and applying CNTs	Measurement of hole diameter and filter size
3	Conductive element inside of the filter	Resistance is within target Range
4	Medium needs to suspend CNTs in space	Increased flow from alignment does not decrease
5	Must desalinate water by a measurable amount	Measure salt content in water
6	Eliminate bacteria and other impurities	Measure the purity of water

Experimentation and Concepts

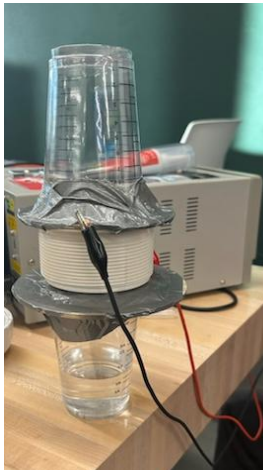


The initial designs were based around using aligned nanotubes with diameters large enough for water but smaller than salt and forcing water through

After concluding such a method was to difficult we began to utilize applying voltage to metal meshes such that the voltage would be parallel to the flow of water to generate an EMF that repelled the salt.



Final Design



The final design we built utilized a drip filtration method of slowly letting the water drip through the filter under no pressure while being subjected to a constant low voltage parallel to the flow of water, and thus creating an EMF that repelled the charged salt ions.

This however did not show us favorable results and instead helped show us that the use of buckypaper under low pressure conditions was not porous enough to serve as a filtration medium.

Testing