

# Project 7

- **Title:** Adjustable pH plasma based water purification system-  
Suprawater
- **PI:** John Foster/Mark Kushner— The University of Michigan
- **Need and Relevance:** Water purification with variable PH
- **Goals:** Understand operation of prototype reactor
- **Approach:** Fabrication/testing
- **Outcomes/Deliverables:** Test data/Hardware
- **Project Duration, Budget:** 1 yr / 90k



High Pressure Plasma Energy,  
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# Need and Relevance

- There is a general need for a water purification technology that can also provide water conditioning such as pH adjustment.
- It has been shown that the pH of the water can greatly affect the biological response in agriculture applications as well as for drinking water.
  - high pH waters have been touted as a means to boost the human immune system.
- Plasmas offer the prospect of not only removing contaminants of emerging concern but also adjusting the pH (w/o consumables)

# Goals

- We will study a plasma reactor geometry ( Prior Suprawater art) that has shown promise for not only cleaning the water but also adjusting its pH.
  - Hardware replication
  - Testing operating range
- We will study the operating mechanisms of the device to better understand the underlying plasma induced chemistry and then use this knowledge to optimize the system.

# Approach

- Our starting point is the Suprawater device.
  - We will fabricate the device in stages to understand underlying operating principles
  - and then study its operating characteristics of the complete system using fast scopes and chemical probes.
  - Simulation tools such as Globakin will be used to access plasma chemistry

# Outcomes/Deliverables

- Chief deliverable is an operating reactor
  - Includes test data
  - documentation describing operation based on experimental investigations
  - Simulation results detailing plasma induced chemistry

# Project Timeline and Duration

Task / month	1	2	3	4	5	6	7	8	9	10	11	12
Fabrication	x	x	x	x								
Testing				x	x	x	x					
Diagostics/optimization/simulation							x	x	x	x		
Finalizing tests, report writing									x	x	x	x

# Project Budget

Item	Cost
Student stipend	\$70,000
Supplies	\$5000
Purchased services	\$ 0.00
Equipment	\$ 10000
Travel	\$ 5000
<b>Project total*</b>	<b>\$ 90,000</b>

\*C-PEAB leadership recommends not to exceed \$40,000/year unless discussed with IAB



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