

Environmental and Water Resources Engineering, and Center for Water and the Environment Seminar Series Presents:



Thursday, February 19th 2026, 3:30-4:30 pm, ECJ 1.324

Zoom Link: <https://utexas.zoom.us/j/84820581097>

Scaling *Moringa Oleifera* Antimicrobial Technology for use as a Nature-Based Solution for Household Water Filtration Systems in Rural Communities

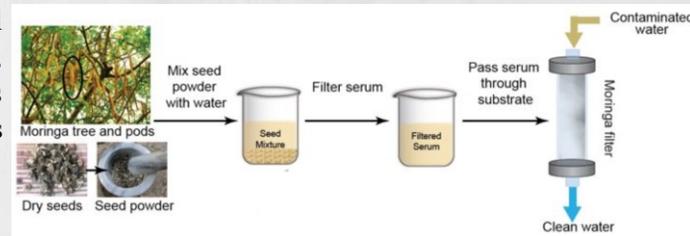
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Advisor: Dr. Manish Kumar



2.1 billion people currently lack access to safely managed drinking water services. The lack of adequate resources to establish centralized treatment systems in many rural regions creates the need for household-level water purification technologies to be scaled and made accessible. *Moringa oleifera* (MO) is a fast-growing and resilient tree that is widespread throughout many tropical and subtropical regions. The tree's seeds are known to have antimicrobial properties and have historically been used as a coagulant for water purification. Beyond their coagulation properties, previous research has shown that these proteins have the ability to adsorb to filtration media, such as sand or cotton. The immobilization of these cationic, antimicrobial proteins onto such media activates the filter to be useful in achieving greater than 7-log *E. coli* and MS2 bacteriophage removal. Although the effectiveness of *Moringa oleifera* proteins in removing bacteria and viruses from water has been extensively studied, there has been limited research conducted to scale this technology for applicable use in developing regions. In this study, we assess the feasibility of incorporating MO protein filter functionalization at a larger scale for use in cotton filters that can be produced using local materials in remote locations to treat drinking water at the household level, while also examining the extent to which MO proteins can increase the virus protection capabilities of currently sold and used low-cost ceramic filters endorsed in the UNICEF household filters products guide.

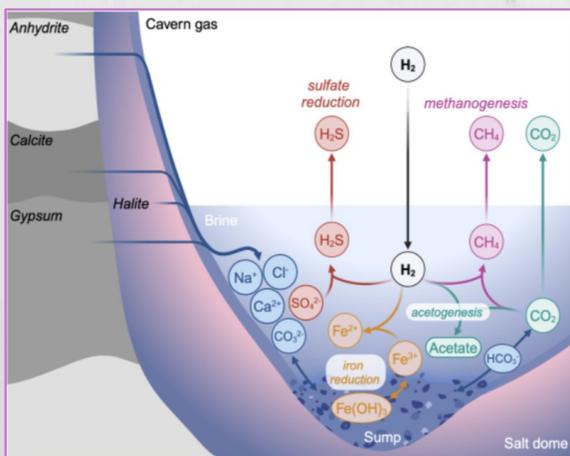


Geologic Hydrogen Production and Microbial Consumption in Subsurface Halite Reservoirs

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Advisor: Dr. Charlie Werth and Dr. Alexandra Clarà-Saracho



Hydrogen's high energy density, carbon-free oxidation, and natural abundance position it as a low-cost, low-emission energy resource in the US. The high reactivity and diffusivity of hydrogen were once thought to prevent accumulation of hydrogen generated through naturally-occurring processes, such as radiolysis, serpentinization, or deep-mantle degassing. However, recent success in the exploration and identification of geologic hydrogen in the United States has challenged this and renewed interest in its potential to enhance domestic energy security. In subsurface halite reservoirs, natural hydrogen production may coincide with dissolution of sulfate and carbonate-bearing minerals, creating favorable conditions for hydrogen-consuming microbial communities. Given that naturally produced hydrogen likely accumulates only at micromolar to millimolar concentrations, determining the minimum amount of hydrogen required to sustain mixed-culture activity is essential for refining current estimates of recoverable hydrogen and its overall resource potential.