



Fabrication And Capillary Flow In Microporous Wick For Non-Thermal Solar Desilantation

Tech ID: 33611 / UC Case 2023-963-0

FULL DESCRIPTION

Background

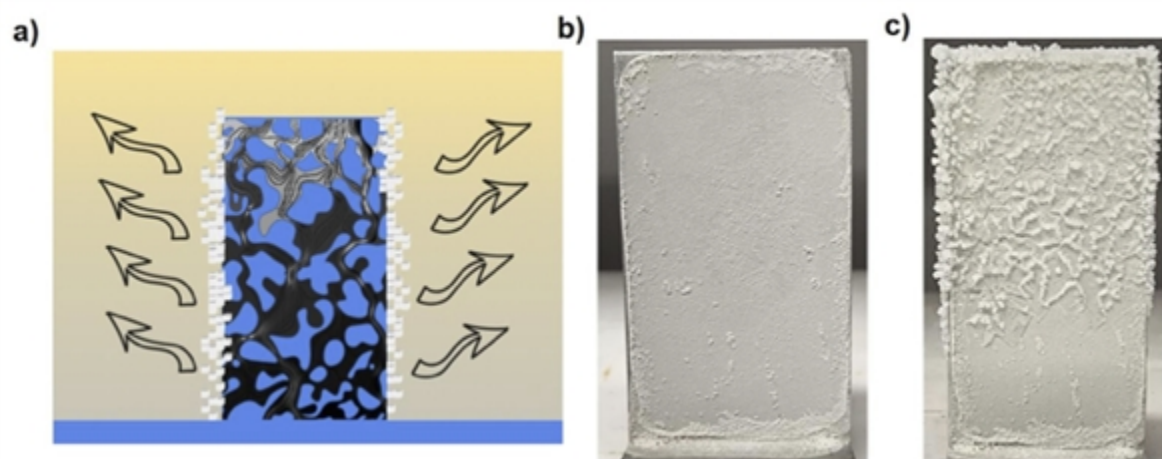
Thermal desalination processes involve the conversion of absorbed heat to evaporate and separate water. Heat leakage causes inefficiencies in these processes - via conduction, convection and radiation. Additionally, water to steam conversion is an energy intensive process.

Mangroves that grow in intertidal zones filter the salt water they absorb using negative pressure that is generated by evaporative capillary forces in their leaves.

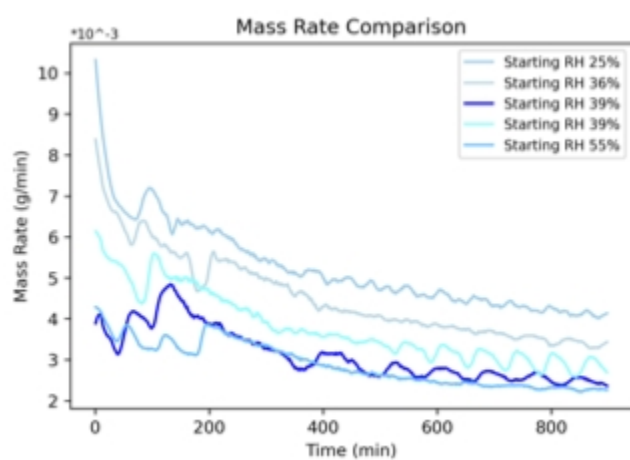
Invention

Taking inspiration from Mangroves, a research team led by Prof. Luat Vuong has developed a novel wick that uses a phenomenon associated with salt creep in which light-induced potentials combine with capillary-based desalination that bypasses the need for thermal evaporation. The wick is made of microparticles sintered together that act as the porous material in which capillary action is induced by shining a light on the wick.

Images



(a) Illustration the process of water evaporation and salt crystallization on the wick. (b) and (c) show the as developed wick pre- and post-trial with 300,000 parts per million (ppm) salinity water.



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OTHER INFORMATION

KEYWORDS

desalination, brine, water purification, salt creep, capillary force, radiative cooling, mangroves

CATEGORIZED AS

- ▶ Environment
- ▶ Remediation
- ▶ Materials & Chemicals
- ▶ Ceramics

RELATED CASES

2023-963-0

Evaporation of water at various relative humidity levels with a 150 mW optical illumination over 1 sq. cm. surface of the wick in 300,000 ppm salinity water.

ADVANTAGES

- ▶ Compared to most desalination technologies that involve expensive materials, the current technology offers a durable and cost-effective solution.
- ▶ Achieves high evaporation rates between 1.5 and 3.2 kg/m²/hour with 1 sun, depending on the relative humidity for high salinity brines.
- ▶ Eco-friendly process - avoids thermal methods of evaporation.
- ▶ Material can withstand high temperatures.
- ▶ Salt creep crystallization via capillary rise is an effective approach for brine and water purification to achieve zero liquid discharge.

SUGGESTED USES

- ▶ Desalination
- ▶ Radiative cooling
- ▶ Water purification of high-salinity brines

INVENTOR INFORMATION

- ▶ Please review [all inventions by Prof. Vuong and her team](#) at UCR.
- ▶ Please visit [Prof. Vuong's group website](#), to learn more about their research.

RELATED MATERIALS

- ▶ [Fabrication and Capillary Flow in Microporous Aluminum Nitride for Non-Thermal Solar Desalination](#)

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20240076213	03/07/2024	2023-963

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