



The Department of Mechanical Engineering presents:

The Master's Thesis Defense of James Leung

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Fabrication and Capillary Flow in Microporous Aluminum Nitride for Non-Thermal Solar Desalination

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Dr. Luat Vuong, Chairperson

Aluminum Nitride (Al-N) is a white, hydrophilic, thermally-conducting, high-band-gap ceramic with low visible-light-spectrum emissivity. Aluminum Nitride being hydrophilic makes it capable of utilizing capillary action, which means it can be used as a material for wicking. Here we report on the light-induced evaporation of saltwater through a capillary wick composed of drop-cast, loosely bonded Al-N microparticles. With 405-nm LED light illuminating the wick, water evaporation rates are increased to levels above equivalent-energy thermal evaporation rates. We checked for the effect of humidity and crystallization on the trials, and showed how both act as inevitable inhibitors to the evaporation process. Oscillations in the evaporation rate occur as well, caused by a dominance in either crystallization or dissolution in the pores. Our observations point to the potential of a novel solar non-thermal desalination approach.