Numerical Study Of A Solar-driven Modular Desalination Device For Remote Areas

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Abstract

The main drawbacks of the desalination technologies are the high energy requirement and the environmental issue related to both the brine discharge and the energy sources exploited. Thus, passive desalination is considered the most suitable expedient to address these issues and to mitigate water scarcity expecially in remote areas. In this work, we studied a device with high performance relying on a multi-stage process that enables latent heat recovery. Numerical simulations are carried out by means of COMSOL Multiphysics® software to figure out the overall effect of several parameters and the best configuration. In detail, these parameters are the convective heat transfer coefficient (h), the membrane porosity (ϵ_m), the air gap (δ) placed between each of the hydrophobic layers and the number of stages (n). The 'heat transfer' and 'transport of diluted species' interface are used. The numerical simulations aim to define the guidelines to better design and prototype the device. Finally, further studies are conducted in order to have a better understanding of the salt rejection phenomenon.