TECHNICAL ASSISTANCE REQUEST

The *Solar Aqua Flex* (*SAF*) team is a group of researchers from Vanderbilt University. We have experience, established procedures, and equipment necessary to fabricate and optimize the proof-of-concept *SAF* prototype. Furthermore, equipment for testing prototype performance, durability, and characterizing system failures are readily available on Vanderbilt campus. However, we expect to encounter several unique challenges while scaling up the device that could be addressed by a facility with larger equipment and space for system fabrication, superior outdoor space and conditions, and access to lined ponds or surface water onsite.

Culmination of proof-of-concept prototyping will result in a 1.05 m^2 alpha-stage prototype. For this, fabrication will not only require more physical space to assemble the system, but also larger fabrication equipment. The components of the system consist of solar absorber for photothermal conversion, hydrophilic wicks for system pumping, microporous hydrophobic membranes for vapor transport and physical separation between feed and distillate liquid, and conductive layer to transfer heat between stages. As such, vacuum ovens, spray coaters, membrane fabrication equipment, adhesive application equipment, hot press equipment, and general space that have the capacity for these prototype systems, and are compatible with the materials used, would enhance the team's ability to optimize the prototype (**Fig. 1**). In an ideal scenario, characterization instrumentation would be onsite so that we can assess the fabrication techniques and system failures rather than sending materials back to our labs in Nashville.

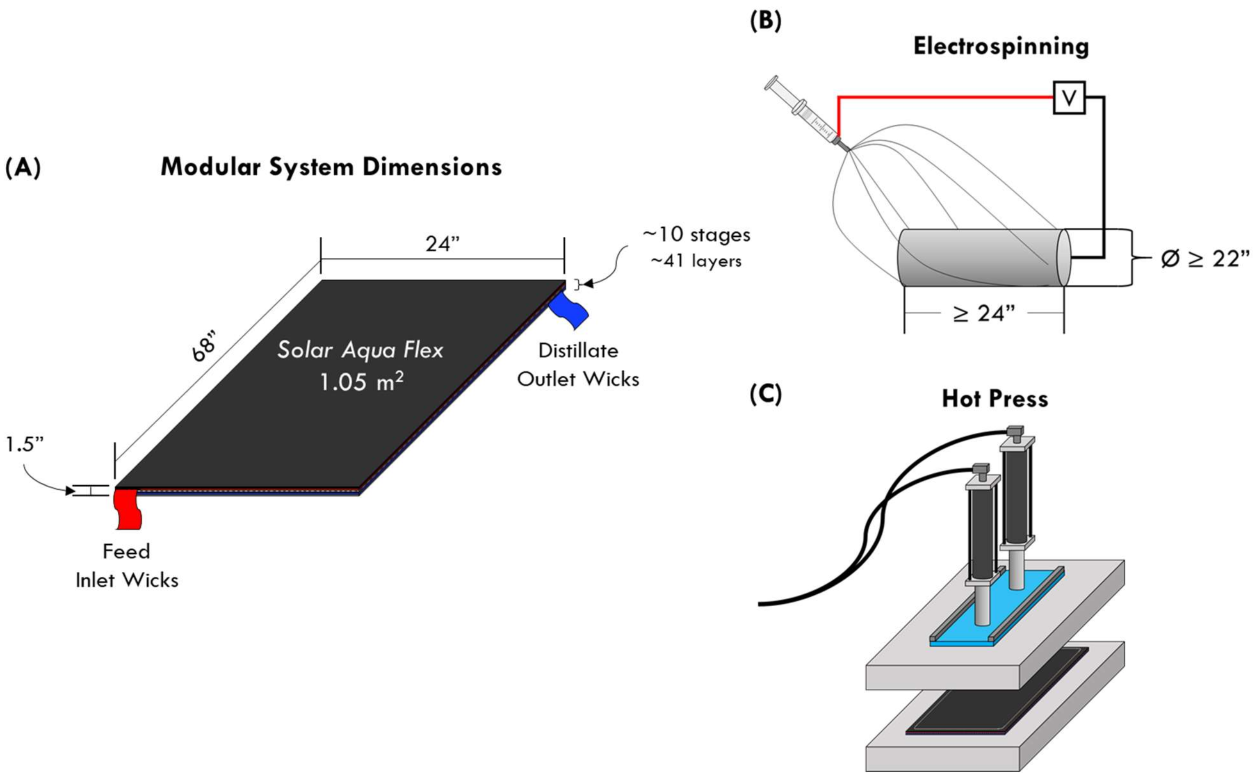

Fig. 1. (A) Dimensions of the modular *Solar Aqua Flex* system. Schematic representations of industrial scale fabrication equipment necessary for the modular system fabrication (B) electrospinning equipment and (C) hot press equipment. Fabrication is not limited to these two specific methods.

Testing the performance of this device and iterations thereof will also require more realistic climatic conditions to that of the end-user, such as the arid western US. For example, in Nashville, TN the average daily sunlight is ~7 hrs with average temperatures around 20°C, while average daily sunlight is closer to 10 hrs with average temperatures around 30°C in the southwestern United states. Furthermore, the team's labs at Vanderbilt are central to the university campus and the metropolitan Nashville area, so campus buildings and city infrastructure cast shadows that cannot be avoided for outdoor prototype testing. Areas with more sun exposure also limits downtime between prototype experiments. Thus, facilities in rural, sunny, arid climates would be ideal for prototype testing.

In the most ideal scenario, the prototype could be repeatedly tested on a stagnant surface water with tunable composition. In a real commercial application, the water fed to the device would vary in composition from user-to-user, but is generally saline, and depending on the species in the solution, close to or approaching the solubility limit. Additionally, the area and depth of this pond would enable testing without significant change in water composition. The 1.05 m^2 devices are modular and can be integrated into a grid to enhance the production of the overall system (**Fig. 2**). Thus, ponds large enough to experiment with ~5-10 m^2 systems would be ideal for identifying any issues that occur during system integration and scale-up. Sites with solar concentrators or reflectors that could integrated around these ponds would also help display the maximum capabilities of the device.

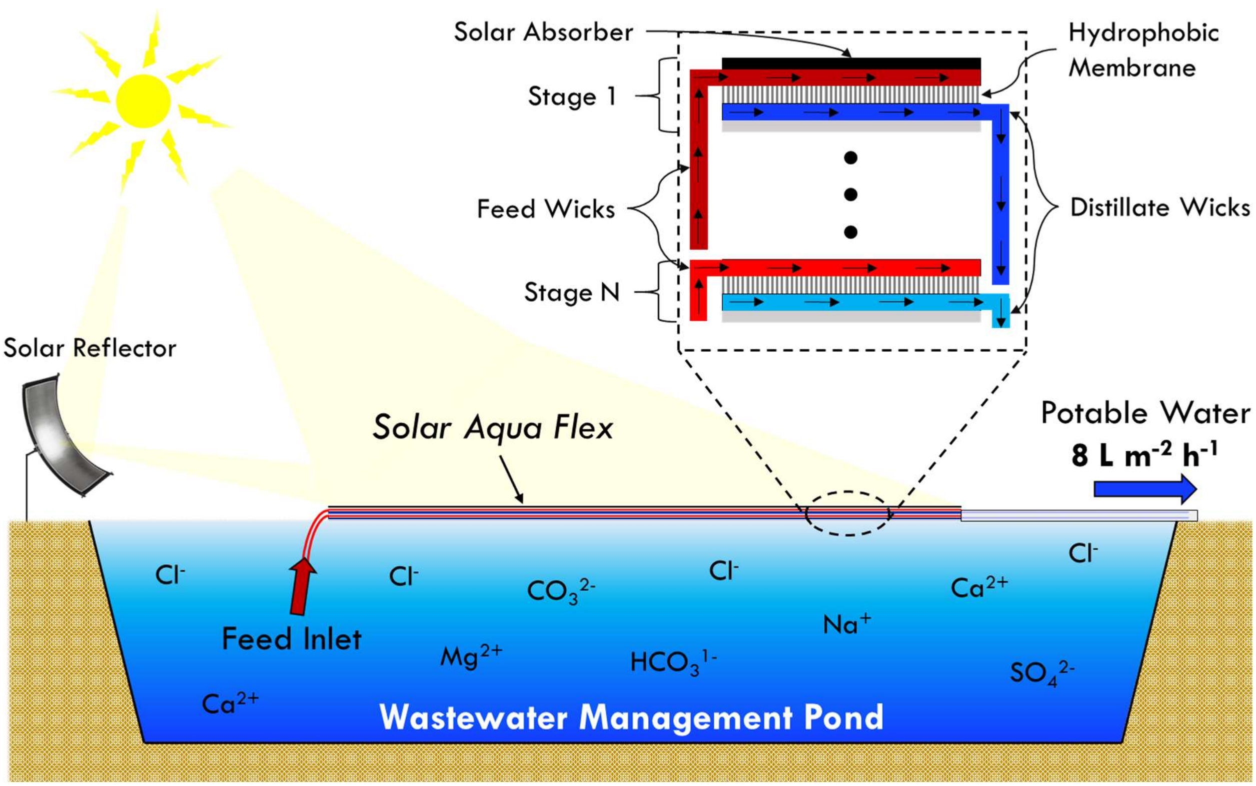

Fig. 2. Schematic representation of *Solar Aqua Flex* system deployed on the feed source, ideally a saline water pond. Solar reflector implementation is optional. Inset shows the breakdown of individual streams and components. Potable water is produced at 8 L m^{-2} h^{-1} and sent to a temporary storage vessel for analysis.