

## Technical Assistance Request

### Project Title: Sorption-based Solar Desalination for High-efficiency Modular Zero Liquid Discharge Treatment

#### Short Introduction of the project:

The proposed technology offers an innovative sorption-based solar-thermal desalination concept enabling an energy-efficient, modular, and cost-competitive zero liquid discharge (ZLD) treatment for a variety of small-scale mobile or semi-mobile applications including inland and oil and gas extraction applications. This project targets development of a modular energy-efficient and cost-competitive solar-thermal zero liquid discharge (ZLD) desalination technology by maximizing the temperature difference between the hot and cold sides of its thermodynamic cycle.

#### Short Introduction of the team:

This is a collaborative project between Energy eXploration (Energy-X) laboratory at Michigan Technological University (MTU), Rackam, Oak Ridge National Lab (ORNL), and Artic Solar brings. The energy-X team is an experimental test laboratory focused on advanced sorption-activated thermal technologies. This includes an emphasis on thermal desalination technologies for both energy improvement and cost reduction. Rackam specializes in the use of solar radiation for the production of heat used in various industrial processes. The project also leverages unique material characterization facilities and computational resources available at ORNL to facilitate technical tasks. In addition, Artic Solar manufactures an advanced patented collector, XCPC (External Concentrating Parabolic Collector), which generates temperatures of up to 200°C without tracking.

#### Technical assistance areas requested:

Our team is currently looking for collaboration with experts who could provide technical assistance in the below areas.

1. Characterization of high-concentrated brine slurries for understanding of the rheological behavior and composition, and pH adjustment for reducing scale/fouling/corrosion issues on both plastic and metallic surfaces.
2. Low-cost fabrication of large-scale textured plastic surfaces through plastic injection molding or other techniques.
3. Low-cost fabrication of large-scale textured metallic surfaces through diffusion bonding or other relevant techniques.
4. Fabrication of low-cost brine crystallizers made of plastics or other materials with low-surface energies.