Title: Development of an algae-based ion pumping membrane for brackish water desalination

Fresh water scarcity is an increasing global concern. One of the viable solutions is desalination. Nonetheless, the current desalination processes compromise the environment by requiring large energy and releasing carbon dioxide, which partially contributed to global warming. Hence, an innovative algae-based desalination approach has been examined due to its low energy consumption and sustainability aspects. In this project, an algae-deposited membrane with biological ion pumping transporters is introduced as a potential strategy to remove salt from brackish water. The algal strain *Chlamydomonas reinhardtii* was trained to acclimate high salinity condition (up to 50 mM NaCl) and then filtrated through a microfiltration PVDF membrane (5 µm pore size). The algae-deposited membrane was evaluated in a U-shaped osmosis apparatus with saline source on one end and deionized water on the other end for 7 hours. The chloride flux ranged between 40 – 60 $mmol.hr^{-1}.m^{-2}$ after the first hour. To further optimize the system, pH and potassium ions were added. Acidic pH range (3-4) and low potassium dosages have shown to increase the efficiency by 30%. This algae-deposited membrane stand-alone technology can be a small-scale and energy-free desalination. If combined with other wastewater treatment or forward osmosis (FO) process, this technology can be scaled-up and provide a sustainable option to fight water scarcity.