The College of Graduate Studies and the College of Science Cordially Invite You to a

Master Thesis Defense

Entitled

FOG HARVESTING USING CHEMICALLY FUNCTIONALIZED POROUS MEMBRANES

by

Afra Saif Ali Saif Alhumaidi

Faculty Advisor

Prof. Yaser E. Greish, Chemistry Department o

College of Science

Date & Venue

2:00 pm

Wednesday, 6 Jun 2023

Room 40 – Building F3

Abstract

This work explores the use of chemically functionalized porous membranes for fog harvesting. Fog water has emerged as a valuable alternative water source in regions where traditional freshwater resources are scarce. However, conventional fog harvesting techniques often suffer from low collection efficiency and limited scalability. To address these challenges, this research investigates the potential of chemically functionalized porous membranes for enhanced fog water collection. The study focuses on the development and characterization of specialized membranes with surface properties optimized for efficient fog droplet capture.

The current study proposes the use of aluminum mesh for fog collection, as it stands out for being considerably simpler and inexpensive. Chemical functionalization involves the use of composite solutions that are comprised of a polymeric matrix and a metal oxide filler. Accordingly, a dip coating approach of a metallic mesh membrane in these composite solutions results in the formation of coatings with variable gradients of hydrophilicity and hydrophobicity. The effect of varying the membrane's surface chemistry on the efficiency of fog harvesting has been evaluated via an experimental setup for fog harvesting under controlled laboratory settings. Additionally, the thesis explored the underlying mechanism governing fog droplet capture, growth and harvesting using the chemically-functionalized membranes. The results of this study is highly believed to contribute to the advancing of fog harvesting technologies by providing a deeper understanding of the process on the chemically-functionalized membranes that have been developed towards an enhanced fog water collection efficiency. Moreover, these findings have significant implications for water resource management in arid and fog-prone regions, where fog can serve as a sustainable water source to alleviate water scarcity challenges.

Keywords: Fog harvesting, surface modification, chemically functionalized membranes, porous membranes, hydrophilic-hydrophobic composite.