MEMAR LAB

Principal Investigator: Dr. Salman Haider

Lab Scope and Nature of Work: Membrane Lab named as MEMAR Lab at NUST university is equipped to study gas separation processes by membranes. Membrane technology includes high selectivity, molecular-level separation, simple operation, low energy demand, and environmental friendliness.

LABORATORY FACILITIES

Hot Press

Vacuum Oven

Gas Chromatography (GC)

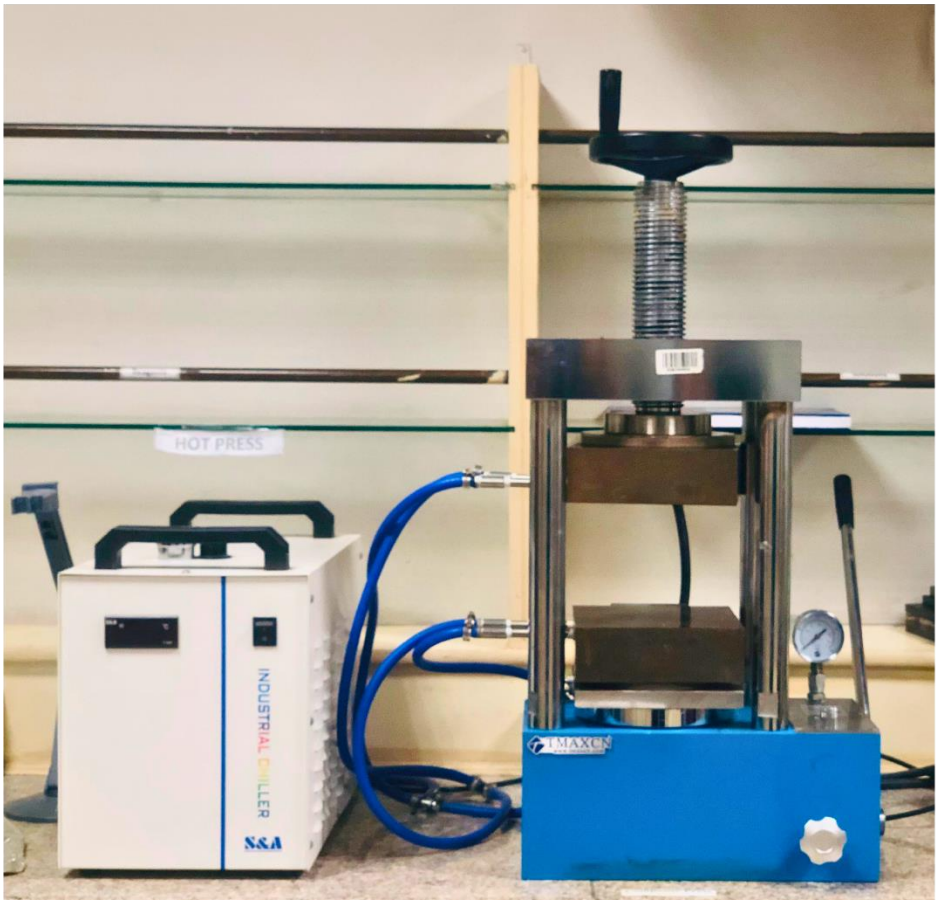
Dip Coater

Centrifuge

Gas Permeability Apparatus

Hot Press

Hot Press is used for the simultaneous application of heat and pressure to samples. It is essential for processing and shaping materials, often used to compact powders or laminate thin films into solid composites or membranes. The controlled temperature and pressure are critical for achieving desired density, thickness, and material integrity, especially in polymer or ceramic processing.



Vacuum Oven

A Vacuum Oven is an enclosed heating unit that operates under reduced atmospheric pressure. This setup allows for the efficient and gentle removal of volatile components, moisture, and solvents from materials at lower temperatures than in a conventional oven. It is crucial for drying sensitive materials, outgassing components, and curing adhesives without causing degradation or oxidation.

Gas Chromatography (GC)

Gas Chromatography is an analytical technique used to separate and analyze compounds that can be vaporized without decomposition. It is used to determine the purity of a substance or to separate the different components of a mixture. GC is highly valuable in catalysis and environmental research for identifying and quantifying gaseous reaction products or analyzing volatile pollutants.

Dip Coater

A Dip Coater is a device used for the precise deposition of thin films onto solid substrates. The substrate is immersed in a liquid precursor solution and then withdrawn at a constant, controlled speed. This method is vital for creating uniform, reproducible thin-film coatings—such as catalytic layers or membranes—for use in devices like solar cells and sensors.

Centrifuge

A Centrifuge is a laboratory device that uses centrifugal force to separate components of a liquid mixture based on density. It spins samples at high speeds, causing denser solids or particles to move to the bottom of the tube while lighter liquids remain on top. It is frequently used in materials synthesis for purifying nanomaterials, separating catalysts from reaction mixtures, or clarifying suspensions.

Gas Permeability Apparatus

This apparatus is specifically designed to measure how quickly a gas passes through a barrier, typically a polymer film or a membrane. It quantifies the **gas permeability coefficient**, which is a critical parameter in the development of separation membranes. The data is essential for assessing the performance of membranes in applications like gas separation and fuel cells.