|  |  |  |
| --- | --- | --- |
|  |  | הטכניון - מכון טכנולוגי לישראל  TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY |
| הפקולטה להנדסה כימית  ע"ש וולפסון |  |  |
| The Wolfson Department of Chemical Engineering |  |  |

**Wolfson Department of Chemical Engineering Seminar**

**Monday, March 11th, 2024 at 13:30**

**Zoom: https://technion.zoom.us/j/96298325147**

**Mimetic-core-shell Design on UiO-66-NH2 via Molecular Imprinting Technology Providing Enhanced Performance of PIM-1-based Mixed Metrix Membrane**

**Ziyi Yuan**

**Ph.D. Mid Seminar**

Advisor: Prof. Viatcheslav Freger & Prof. Xuezhong He

Department of Chemical Engineering, Technion-Israel Institute for Technology

Global environmental problems induced by huge amounts of CO2 emissions have attracted increasing attention. Intergovernmental Panel on Climate Change (IPCC) has proposed a suggestion of reducing 49 % of CO2 emissions by 2030 to meet the target of limiting global warming. Membrane separation has been investigated as a promising strategy for carbon capture and storage (CCS) due to its properties of small footprint, environmentally friendly, high efficiency, and low cost, which shows the potential for upscaling. Polymers of intrinsic microporosity (PIMs) are attractive in gas separation for their high fractional free volume, while the relatively unsatisfied selectivity cannot be ignored. The molecular imprinting technique (MIT) is a versatile approach to introducing three-dimensional holes into polymer matrixes, which contain specific recognition sites to the templates (atoms, ions, molecules, or complexes). This work employed MIT to prepare a layer containing rich CO2 adsorption sites on the UiO-66-NH2 surface for fabricating PIM-1-based CO2 separation MMMs. The obtained MMMs showed good CO2/N2 separation performance with CO2 permeability of over 12,000 Barrer and CO2/N2 selectivity of about 32, which is beyond the 2019 Robinson upper bond. Moreover, with a filler loading as high as 13%, the membrane maintained good mechanical properties, indicating that the imprinted layer could improve the compatibility between filler and polymer matrix. The mutual benefit between MIT and MOFs presents their potential for the improvement of MMMs performance in the gas separation field.