Ph.D. Open Seminar

Title of Thesis: **N-rich nanoporous organic materials for CO_2 capture and conversion**

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Abstract

Porous organic materials have gained significant research attention because of their wide range of applications in gas sorption, gas and liquid separation, catalysis, electrochemical energy storage, and water purifications.[1,2] The control over the growing abundance of greenhouse gases in the atmosphere by the capture of CO_2 from the flue gas through physisorption is one of the important and challenging problems to be addressed. Porous materials because of the high thermal and hydrothermal stability have attracted a lot of interest in capturing the atmospheric CO_2 through physisorption compared to the already existing amine-based technology (chemisorptions). Recent advancements in heteroatom-containing, electron-rich porous organic polymers (POPs) have shown to exhibit efficient capture and catalytic conversion of CO_2. The scientific community now focuses on the question as to whether the abundant and inexpensive CO_2 can be utilized to generate the materials of commercial interest as a C1 feedstock. In the present thesis, we have discussed the new design strategy of the monomers and porous polymers for the selective capture of CO_2 under ambient conditions.[3] We demonstrated the role of the ionic-core of triaminoguanidinium halide in POPs to facilitate the selective CO_2 capture and conversion to value-added products and their antimicrobial applications.[4] Further, we have also demonstrated the use of the organic nanocages in CO_2 capture and conversion.[5]

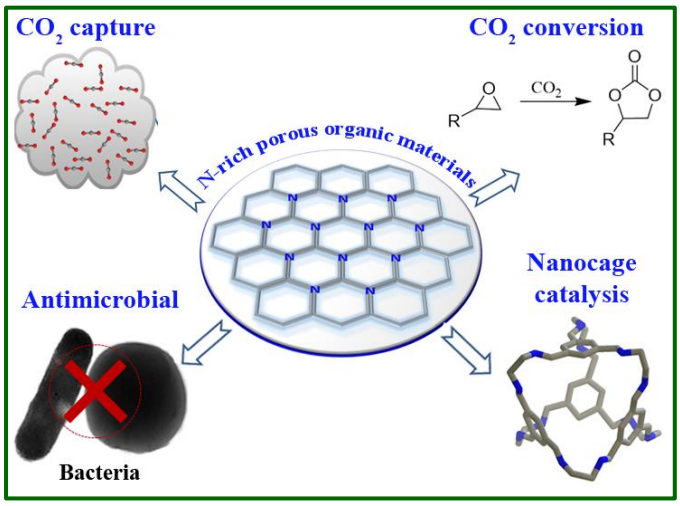

Figure 1 Schematic illustration of promising applications of porous organic materials developed in the present study.

References:

1. Slater, A. G.; Cooper, A. I. *Science* **2015,** *348*, 6238.
2. Bandyopadhyay, S.; Singh, C.; Jash, P.; Hussain, M. W.; Paul, A.; Patra, A. *Chem. Commun*., **2018**, *54*, 6796.
3. Hussain, M. W.; Bandyopadhyay, S.; Patra, A. *Chem. Commun.*, **2017**,*53*, 10576.
4. Patent Application Number: 201921010663 (*manuscript under preparation).*
5. Hussain, M. W.; Patra, A. (*manuscript under preparation*).