5

Metal-organic and covalent-organic frameworks for CO_2 capture

Supriyanka Rana[1,2,3], Eshita Sharma[4,5], P. Mishra[6], L. Singh[7,8], Z.A. Wahid[1], R. Gupta[2] and Swati Sharma[9]

[1]Faculty of Engineering Technology and Earth Resources, Universiti Malaysia Pahang, Lebuhraya Tun Razak, Gambang, Kauntan, Pahang, Malaysia [2]Department of Biotechnology, Himachal Pradesh University, Shimla, Himachal Pradesh, India [3]Indira Gandhi Medical College Shimla, Himachal Pradesh, India [4]CSIR-Institute of Himalayan Bioresource Technology, Palampur, Himachal Pradesh, India [5]Department of Molecular Biology and Biochemistry, Guru Nanak Dev University, Amritsar, Punjab, India [6]Department of Biology, Hong Kong Baptist University, Kowloon Tong, Kowloon, Hong Kong [7]Department of Environmental Science, SRM University, Amaravati, Andhra Pradesh, India [8]Department of Chemistry and Industrial Chemistry, Sardar Patel University, Mandi, Himachal Pradesh, India [9]University Institute of Biotechnology, Chandigarh University, Mohali, Punjab, India

5.1 Introduction

Global efforts to counteract CO_2-inflicted climate change have incited interest in versatile emissions mitigation technologies. The CO_2 sequestration and catalytic conversion using porous metal-organic framework (MOF)- and covalent-organic framework (COF)-based materials are vital strategies to counteract the escalating CO_2 emissions (Siegelman et al., 2021), a chief prerequisite to achieve sustainable living (Wigley et al., 1996). These porous materials have a wide range of industrial applications such as sorbents, filters, membranes, and catalysts (Zhao, 2016). Function-led designing of novel porous materials like MOF and COF materials has established their prominent role in processes such as molecular separation (CO_2 capture/encapsulation) and catalysis (catalytic conversion into valuable renewable low-carbon fuels/products). Although the largest contribution was made by MOF materials in the field of CO_2 capture/conversion so far, COF materials are still developing

CO_2-philic Polymers, Nanocomposites and Solvents. DOI: https://doi.org/10.1016/B978-0-323-85777-2.00008-1