Zeolitic imidazolate framework (ZIF-22) with LTA topology as an efficient catalyst for CO_2 fixation with propylene oxide

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Carbon dioxide is increasingly regarded as a ubiquitous and nontoxic C1 feedstock for the preparation of bulk commodity chemicals, and thus, it can be considered as a promising future alternative to depleting carbon-based fossil fuel sources. Zeolitic imidazolate frameworks (ZIF) are nowadays acclaimed porous framework materials for CO_2 adsorption. In here, a highly porous zeolitic imidazolate framework (ZIF-22) with LTA topology was synthesized by solvothermal and microwave methods using $Zn(NO_3)_2.4H_2O$ and 5-azabenzimidazolate linker. The synthesized ZIF-22 was characterized using XRD and SEM techniques and were examined for its catalytic abilities for the cycloaddition of CO_2 to propylene oxide (PO) yielding propylene carbonate under solvent free and co-catalyst free moderate reaction conditions. The mechanism of catalysis is thought to involve the Lewis acidic metal centers (Zn) and the N atom in the 5^{th} position of the 5-azabenzimidazole linker acting synergistically. Through this study, we aimed at exploring the possibility of tuning ZIF materials as a bridge between CO_2 adsorption and transformation into value added products.