Catalyzing the Conversion of CO_2 to Cyclic Carbonates Using MOF Catalyst Synthesized by an Eco-friendly Protocol

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Metal Organic Frameworks (MOFs) are regarded as a very efficient class of materials for the capture of greenhouse gases including CO_2, and very recently in the transformation of CO_2 to products such as cyclic carbonates. The catalysis of cyclic carbonate production from epoxides and CO_2 is a 100% atom-economic transformation of CO_2. Thus, MOFs for CO_2 cycloaddition represents an integrated approach for Carbon Capture and Utilization (CCU) that circumvents the energy expenditure associated with the desorption and storage of the captured CO_2. However, the usage of expensive constituents, synthetic ligands and toxic solvents in MOF synthesis, and remains of their traces in the final product are the major economic and environmental hurdles in industrial scale up of MOF production. Amino acids are natural ligands which possess amino-carboxylate moieties and side chain functional groups for an efficient and functional MOF design. Herein, we report the synthesis and characterization of a zinc based amino acid MOF (AA-MOF) and catalysis for cyclic carbonate synthesis from epoxides and CO_2. The role of reaction parameters was investigated and a plausible mechanism was proposed. The catalyst was recycled.