A Mixed Metal Triazole Framework Catalyst for the CO_2 Transformation to Cyclic Carbonates

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Metal organic frameworks are emerging materials in the field of catalysis, owing to their diverse and unique features. They have been dynamically investigated as catalysts for the cycloaddition reaction of CO_2 with epoxides owing to its greater CO_2 affinity and ability to concurrently occupy Lewis/Bronsted acidic and basic sites The catalytic ability of two microporous heterometallic triazolate metal organic frameworks towards the cycloaddition of CO_2 with epoxides yielding cyclic carbonates was investigated with tetrabutyl ammonium bromide co-catalysts. For the purpose, a reported Zn-Ni triazolate and a novel Zn-Ti triazolate MOF were synthesized hydrothermally and characterized. Le-Bail refinement was used to analyze the structure of the Zn-Ti triazolate framework and the framework was found to crystallize in a cubic unite cell with multiple Zn atoms forming paddle wheel structure. Cyclic carbonate yields of 50~96% was obtained at mild reaction conditions of 25~45 °C, 1MPa CO_2 pressure, in 12-24 h. The MOFs were found perfectly reusable with 99% selectivity towards cyclic carbonates.