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Abstract

Triazole-based MOF for the efficient solvent-free CO2 fixation reaction via cyclic carbonates synthesis

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Abstract:

TThe increase of greenhouse gases such as carbon dioxide (CO2) in the atmosphere causes serious climate problems. The release of CO2 by anthropogenic activity may lead to a rise in global temperature over the past several hundred years. Hence, effective methods to capture CO2 and mitigate CO2 emissions are urgently demanded. Several strategies have been attempted to reduce CO2, including physical adsorption, and chemical sequestration of CO2. In situ conversion of the captured CO2 into useful product could be the most effective method for CO2 treatment. The CO2 cycloaddition reaction is an important reaction for producing cyclic carbonate, which has a wide range of applications in many fields. Various heterogeneous catalysts have been developed for CO2 cycloaddition reactions, including metal oxides, zeolites, metal-organic frameworks (MOFs) and supported catalyst. Among these catalysts, MOFs have attracted increasing interest due to their excellent properties such as many reactive sites, large surface area, high absorption capacity and well tunable pore structures. It has been reported that MOF-5, Co-MOF-74, Mg-MOF-74, MIL-125-NH2, UiO-66-NH2, Fe-MIL-101, Cr-MIL-101, PCN-224, PCN-700, Hf-Nu-1000, MMCF-2 and MMPF-18 as catalysts can well accelerate the CO2 coupling with epoxide. In this seminar, a highly new porous and stable metal-organic framework containing both metal sites (Zr clusters as Lewis acid sites) and nitrogen rich triazole group (as Lewis base sites) was successfully synthesized via solvothermal reaction. Triazole containing MOF exhibit superior catalytic activities in solvent free CO2 cycloaddition with epoxides. It was demonstrated that the highly performance of triazole containing catalyst is due to the presence of nitrogen groups of triazole moiety which can act as Lewis base. In addition the MOF catalyst showed excellent stability and easy recyclability in comparison with homogenous catalysts.

Biography:

Pourya Zarshenas was born in 1994, Tehran-Iran. He started B.Sc. (Pure Chemistry) in 2013 at Shahid Beheshti University. He finished B.Sc. in 2017. Immediately he Started M.Sc. in 2018 at Shahid Beheshti University in Inorganic chemistry. His last project is "Nano-composites sensors for detecting heavy metals"& He wants to continue his academic education in Material Chemistry. Professional young chemist with more than 5 years, experience in the laboratory and a strong working knowledge of the Research. Excellent command of the English language, including oral and written comprehension skills. Critical thinker who is reliable, responsible & organized! Outstanding critical thinker who can use logic and reasoning to identify weaknesses in laboratory research and modify the research plan to create a stronger proposal that yields more concise results. A co-worker who has knowledge of teaching methods that helps new employees, interns, and others to learn how to properly conduct research in a laboratory environment.

Publication of speakers:

1. Sedghi, Roya & Heidari, Bahareh & Shahmohamadi, Hatef & Zarshenas, Pourya & Varma, Rajender. (2019). Pd Nanocatalyst Adorned on Magnetic Chitosan@N-Heterocyclic Carbene: Eco Compatible Suzuki Cross-Coupling Reaction. Molecules. 24. 10.3390/molecules24173048.

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