

# Challenges in the Synthesis of CO<sub>2</sub>-Based Metal-Organic Frameworks: Investigating the Sensitiveness of Synthetic Parameters for Practical Application

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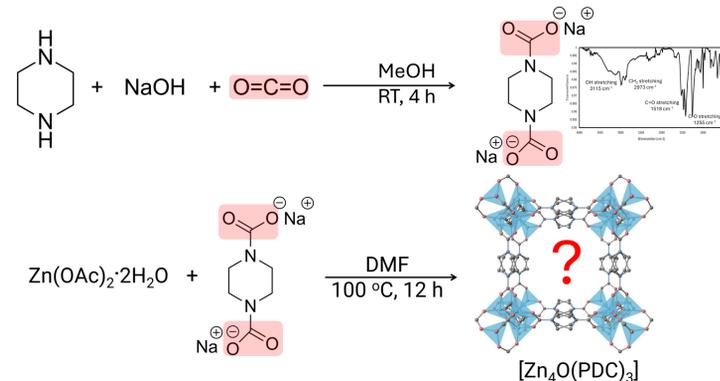
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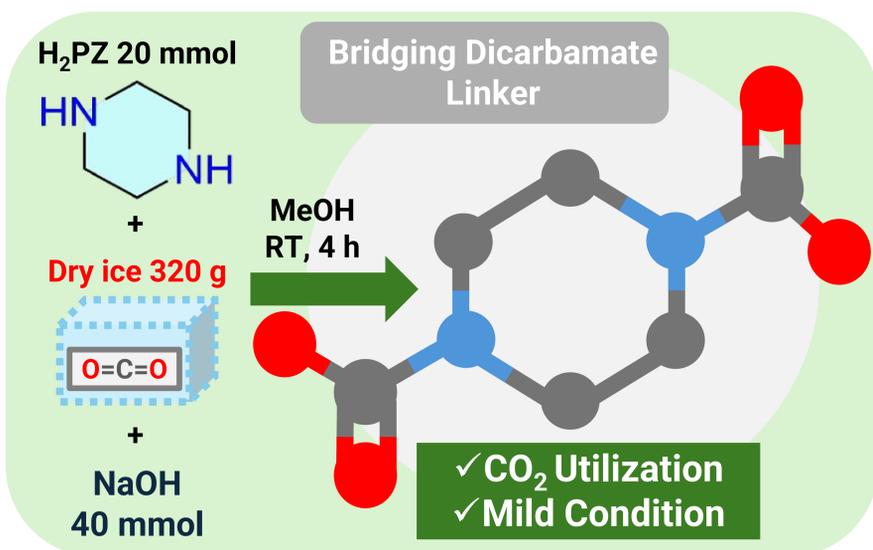
## ABSTRACT

This research explores and investigates the **sensitiveness** of the CO<sub>2</sub>-based MOF synthesis in stoichiometry, solvent, temperature and synthetic method, in order to find a practical way to synthesize the CO<sub>2</sub>-based MOF. Powder X-ray diffraction (PXRD), Fourier transform infrared (FTIR) spectroscopy, and other techniques were employed to analyze the obtained bulk materials. The results indicate that the practical ways to applied the reported reaction is *not-so-easy*.



## METHODOLOGY

Synthesis of Sodium Piperazine-1,4-dicarbamate from Dry Ice



Synthesis of Zinc(II) Metal-Organic Framework (Zn-MOF) by Solvothermal Technique



## Synthetic Parameters Exploration

Entry	1*	2	3	4	5
M:L	4:3	4:3	3:2	5:4	4:3
Conditions	i-PrOH DMF (RT)	DMF/DI (120 °C)	DI (100 °C)	DMF (100 °C)	

\*J. Am. Chem. Soc. 2021, 143, 40, 16750–16757.

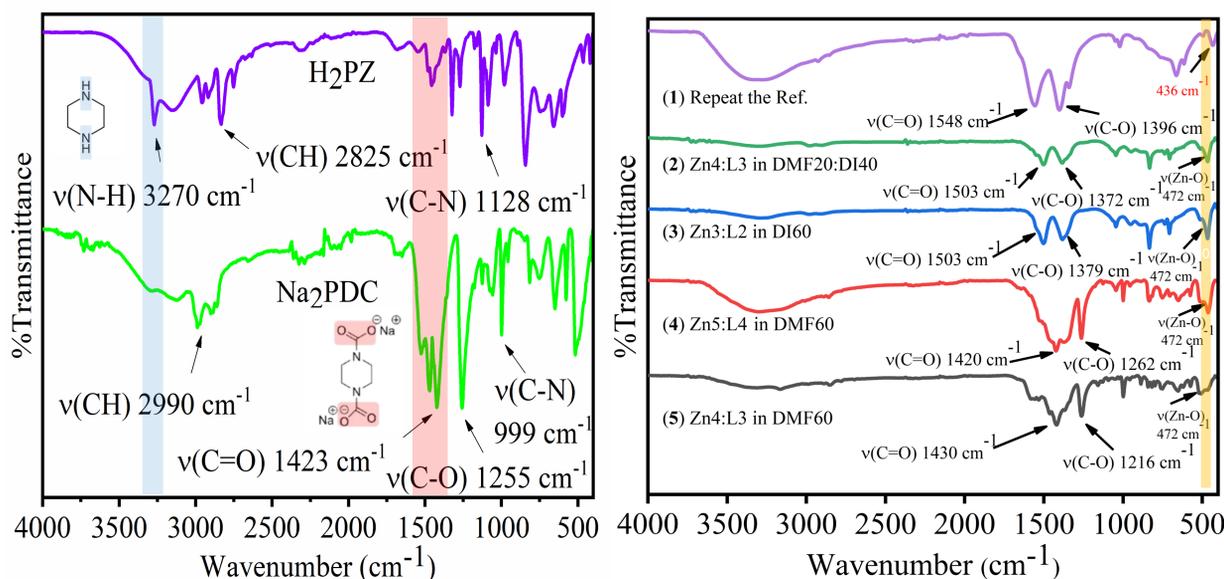
## Key Findings

- The reported procedure cannot be reproduced under simplified conditions outside the glovebox.
- Modified simple procedures** were explored and found to be successful for the aimed CO<sub>2</sub>-based MOF with some identified crystalline phases.

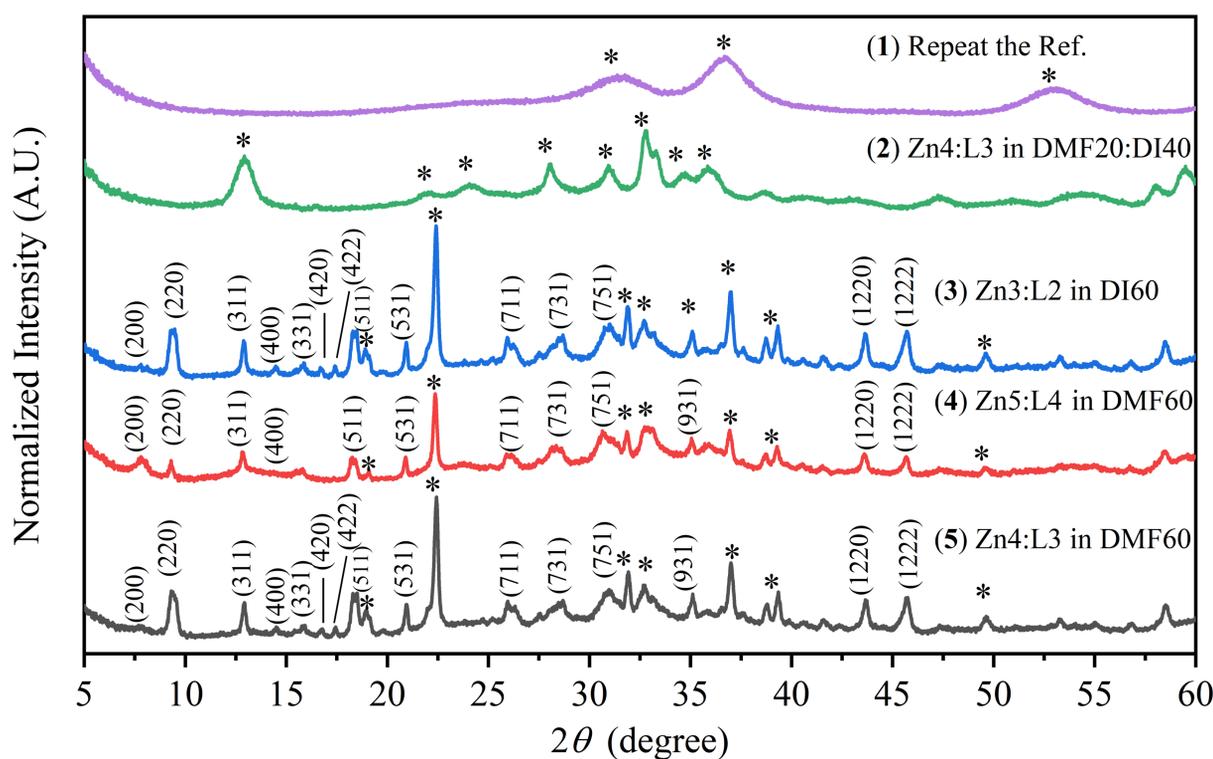
## RESULTS

Characterizations of Organic Linker and the Obtained Solids

### FTIR: Functional Group Analysis



### PXRD: Crystalline Phase Identification



## CONCLUSION

- CO<sub>2</sub>-based MOF reported in JACS is *not-so-easy* to reproduce.
- The synthetic parameters were explored and the modified methods lead to the formation of the MOF instead.

## ACKNOWLEDGMENTS

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