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Research Keywords

Metal-organic frameworks (MOFs), Metal-organic polyhedra (MOPs), Self-assembly of MOPs, Multivariate MOPs, MOF catalysts

Education

02/2022

Ph. D. in Chemistry

Ulsan National Institute of Science and Technology (UNIST), Ulsan, 44919, Republic of Korea

Dissertation Title: Sequential Assemblies of Zr-Based Metal-Organic Polyhedra and Catalytic Properties of Zr-Based Metal-Organic Frameworks
(Advisor: Prof. Wonyoung Choe)

02/2016

B.S. in Molecular Sciences

Ulsan National Institute of Science and Technology (UNIST), Ulsan, 44919, Republic of Korea

Professional Experience

2023 – present

Postdoctoral researcher, Catalan Institute of Nanoscience and Nanotechnology (ICN2), Spain

2022 – 2023

Postdoctoral researcher, Ulsan National Institute of Science and Technology (UNIST), Republic of Korea

Awards & Honors

- 12/2021 **Graduate Student Excellent Research Award**
Ulsan National Institute of Science and Technology (UNIST), Republic of Korea
- 06/2021 **UBSI Basic Science Researcher Incubating Program**
UNIST Basic Science Institute
- 06/2019 **Best Poster Award**
Inorganic Chemistry Division, Korean Chemical Society
- 02/2017 **Samsung Humantech Paper Award**
Samsung Electronics

Publications

1. Lee, S.; **Nam, D.**; Yang, D.;* Choe, W.*
Unveiling Hidden Zeolitic Imidazolate Frameworks Guided by Intuition-Based Geometrical Factors
Small 2023, 2300036.
In Press
2. **Nam, D.**; Kim, Y.; Kim, M.; Nam, J.; Kim, S.; Jin, E.; Lee, C. Y.; Choe, W.*
Pesticide Degradation with Porphyrin-Based Metal-Organic Frameworks
Inorg. Chem. 2021, 60, 10249–10256.
(Selected as Supplementary Cover)
3. **Nam, D.**;[†] Kim, J.;[†] Hwang, E.; Nam, J.; Jeong, H.; Kwon, T.-H.;* Choe, W.* ([†] equally contributed)
Multivariate Porous Platform Based on Metal-Organic Polyhedra with Controllable Functionality Assembly
Matter 2021, 4, 2460–2473.
4. Lee, S.; Jeong, H.; **Nam, D.**; Lah, M. S.;* Choe, W.*

The Rise of Metal-Organic Polyhedra

Chem. Soc. Rev. 2021, 50, 528–555.

5. Kim, J.; **Nam, D.**; Kitagawa, H.; Lim, D.-W.;* Choe, W.*
Discovery of Zr-Based Metal-Organic Polygon: Unveiling New Design Opportunities in Reticular Chemistry
Nano Res. 2021, 14, 392–397.
6. Kim, W. G.; Baek, S.-Y.; Jeong, S. Y.; **Nam, D.**; Jeon, J. H.; Choe, W.; Baik, M.-H.;* Hong, S. Y.*
Nickel-Catalyzed Chemo- and Regioselective Azide–Alkyne Cycloaddition: Electronically-Biased Internal Alkyne-Specific Reactivity Propensity
Org. Biomol. Chem. 2020, 18, 3374–3381.
7. Lee, H.-J.; Jung, S.; Cha, J.-H.; **Nam, D.**; Choe, W.; Jung, D.-Y.*
Trivalent Copper and Indium Heterometallic Complex with Dithiocarbamate and Iodide Ligands
J. Mol. Struct. 2020, 1204, 127478.
8. Maiti, S.; Kim, J.; Park, J.-H.; **Nam, D.**; Lee, J. B.; Kim, Y.-J.; Kee, J.-M.; Seo, J. K.; Myung, K.; Rohde, J.-U.; Choe, W.; Kwon, O.-H.;* Hong, S. Y.*
Chemoselective Trifluoroethylation Reactions of Quinazolinones and Identification of Photostability
J. Org. Chem. 2019, 84, 6737–6751.
9. Lee, Y. H.; Shin, D.-S.; Kim, D. Y.; **Nam, D.**; Choe, W.; Hong, S. Y.;* Oh, J. H.*
Organic Phototransistors Based on Self-Assembled Microwires of *n*-Type Distyrylbenzene Derivative
Asian J. Org. Chem. 2018, 7, 2302–2308.
10. Lee, H. H.; **Nam, D.**; Kim, C.-K.; Kim, K.; Lee, Y.; Ahn, Y. J.; Lee, J. B.; Kwak, J. H.; Choe, W.;* Choi, N.-S.;* Hong, S. Y.*
Molecular Engineered Safer Organic Battery through the Incorporation of Flame Retarding Organophosphonate Moiety
ACS Appl. Mater. Interfaces 2018, 10, 10096–10101.

11. **Nam, D.**; Huh, J.; Lee, J.; Kwak, J. H.; Jeong, H. Y.; Choi, K.; Choe, W.*
Cross-Linking Zr-Based Metal-Organic Polyhedra via Postsynthetic Polymerization
Chem. Sci. 2017, 8, 7765–7771.
(Times cited: 77)

Patents

1. “Nerve agent degradation with porphyrin-based metal-organic frameworks” Korean Patent No. 10-2220627 (2021)
2. “Isoreticular Series of Zr-Based Metal-Organic Polyhedra with Multiple Functional Groups” Korean Patent No. 10-2075341 (2020)
3. “Crystallized porous polymeric metal-organic polyhedra and preparing method thereof” Korean Patent No. 10-1927205 (2018)
4. “The large scale synthesis of UMOP-1-H” Korean Patent Application 10-2021-0032888 (2021)
5. “The large scale synthesis of UMOP-2” Korean Patent Application 10-2021-0032892 (2021)
6. “Organophosphate pesticide degradation with metal-organic frameworks” Korean Patent Application 10-2020-0128793 (2020)
7. “Mixing Strategies for Multivariate Metal-Organic Polyhedra” Korean Patent Application 10-2020-0119235 (2020)

Research Skills

Characterizations

Single-crystal X-ray diffraction

Self-user license for UNIST equipment (Rigaku)

Data collection in Synchrotron (Pohang Accelerator Laboratory)

Structure refinement with ShelX software

Preparing publishable crystallographic data and reporting in CCDC

Powder X-ray diffraction

Gas sorption

N₂ sorption, CO₂ sorption

BET surface area, Pore size distribution, Enthalpy of adsorption, Selectivity

Spectroscopy

UV-vis absorption spectroscopy

Infrared spectroscopy

Fluorescence spectroscopy

Nuclear magnetic resonance spectroscopy (^1H , ^{13}C , ^{31}P)

Thermogravimetric analysis

Synthesis & Techniques

Synthesis of MOFs

Synthesis of MOPs

Recrystallization of MOPs

Synthesis of MOP-polymer composites

Metalation of porphyrin ligands (Al^{3+} , Zn^{2+} , Co^{3+})

Handling air sensitive reactions (Schlenk line)

In-situ NMR analysis for MOF catalysis and kinetics data analysis

Recyclability test for MOF catalysis (simple continuous flow system)

Visualization & modelling software

Electron density map visualization (VESTA)

Molecular structures and crystal structures modelling (Materials Studio)

General 3D structures modelling for high-quality figures (Blender)

(Figure drawn by myself was selected as a Supplementary Cover in *Inorganic Chemistry*)

Conference Presentations

1. **MOF2022: 8th International Conference on Metal-Organic Frameworks and Open Framework Compounds**, Beyond Random Self-Assembly: Multivariate Porous Platform Based on Metal-Organic Polyhedra (4–7/9/2022, Poster)
2. **127th General Meeting of KOREAN CHEMICAL SOCIETY**, Metal-Organic Frameworks for Catalytic Detoxification of Pesticides, Republic of Korea (21–23/4/2021, Poster)
3. **2019 Korea Crystallographic Association**, Zr-Based Metal-Organic Polyhedra as Multivariate Porous Platforms, Republic of Korea

(01/11/2019, Poster)

4. **The 1st Kyoto University-UNIST Joint Symposium on Chemistry and Materials Science**, Isoreticular Zr-Based Metal-Organic Polyhedra as Multivariate Porous Platforms, Japan (24–26/10/2019, Poster)
5. **2019 KCS Inorganic Chemistry Division Summer Symposium**, Zr-Based Metal-Organic Polyhedra as Multivariate Porous Platforms, Republic of Korea (20–21/06/2019, Poster)
6. **MOF2018: 6th International Conference on Metal-Organic Framework and Open Framework Compounds**, Cross-Linking Zr-Based Metal-Organic Polyhedra via Postsynthetic Polymerization, New Zealand (09–13/12/2018, Oral)
7. **2018 KCS Inorganic Chemistry Division Summer Symposium**, Metal-Organic Frameworks Assembled from Phosphonate Linkers: Structures and Functions, Republic of Korea (28–29/06/2018, Poster)
8. **255th ACS National Meeting**, Cross-Linking Zr-Based Metal-Organic Polyhedra via Postsynthetic Polymerization, Unites States (18–22/03/2018)
9. **2017 KCS Inorganic Chemistry Division Summer Symposium**, Cross-Linking Zr-Based Metal-Organic Polyhedra via Postsynthetic Polymerization, Republic of Korea (20–21/07/2017, Oral)
10. **118th General Meeting of KOREAN CHEMICAL SOCIETY**, PolyMOPs: Crystallized Polymeric Metal-Organic Polyhedra, Republic of Korea (12–14/10/2016, Poster)