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*New Research Field
Development Project

Res. (pt.)

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Students

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JAMIL, Mohamad Shazwan Shah (Ph.D.) Universiti Teknologi Malaysia, Malaysia, 16 July 2024–12 October 2024

Scope of Research

Developing efficient energy storage systems and innovative material production processes is a significant challenge for chemists in contributing to a sustainable society. We approach these problems using transition metal clusters, of which multiple metal atoms work together as catalysts and functional materials. Our laboratory focuses explicitly on creating a new method to synthesize the clusters with atomic precision and applying the obtained clusters to difficult chemical conversions, such as the reduction of CO₂ and N₂.

KEYWORDS

Transition Metal Clusters
Homogeneous Catalysis
Nitrogen Fixation
Bioinorganic Chemistry



Recent Selected Publications

Izu, H.; Shimoyama, S.; Tanifuji, K.; Ohki, Y., Synthesis of Cubic [Mo₃S₄M] (M = Rh, Ir) Clusters for Borylation of C–H Bonds in Aromatic Compounds, *Organometallics*, **43**, 3251–3257 (2024).

Matsuoka, Y.; Sakai, Y.; Izu, H.; Shimoyama, S.; Fujisawa, M.; Tada, M.; Lakshan, N. M.; Sameera, W. M. C.; Tanifuji, K.; Ohki, Y., Silylation of N₂ Catalyzed by Cubic [Mo₃S₄Ni] Clusters Bearing Mo-bound Cyclopentadienyl Ligands, *Coord. Chem. Res.*, **1**, 100001 (2024).

Izu, H.; Bhave, D. G.; Matsuoka, Y.; Sameera, W. M. C.; Tanifuji, K.; Ohki, Y., Synthesis, Characterization, and Catalytic Activity of a Cubic [Mo₃S₄Pd] Cluster Bearing Bulky Cyclopentadienyl Ligands, *Eur. J. Inorg. Chem.*, **26**, e202300399 (2023).

Ohki, Y.; Munakata, K.; Matsuoka, Y.; Hara, R.; Kachi, M.; Uchida, K.; Tada, M.; Cramer, R. E.; Sameera, W. M. C.; Takayama, T.; Sakai, Y.; Kuriyama, S.; Nishibayashi, Y.; Tanifuji, K., Nitrogen Reduction by the Fe Sites of Synthetic [Mo₃S₄Fe] Cubes, *Nature*, **607**, 86–90 (2022).

Lee, C. C.; Kang, W.; Jasiewski, A. J.; Stiebritz, M. T.; Tanifuji, K.; Ribbe, M. W.; Hu, Y., Evidence of Substrate Binding and Product Release via Belt-Sulfur Mobilization of the Nitrogenase Cofactor, *Nat. Catal.*, **5**, 443–454 (2022).