筑波大学理工学群化学類
筑波大学大学院数理物質科学研究群化学学位プログラム
筑波大学エネルギー物質科学研究センター（TREMS）

第18回元素化学セミナー・講演会

◆講師◆　TU University Dresden (Germany)

Prof. Dr. Jan J. Weigand

◆日時◆　令和8年 3月11日（水）

16:00 ～ 17:30

◆場所◆　総合研究棟Ｂ１１０室

◆演題◆

Modular Silver-Phosphinidenide Clusters as Building Blocks for Multidimensional Metal-Organic Frameworks

ドレスデン工科大学のJan. J. Weigand先生は、リンを中心とした元素化学を専門とし、超分子化学、環境化学等の幅広い研究分野で活躍されている、国際的に著名な研究者です。
今回、JSPS招聘研究者として来日された機会に、筑波大学にて最新の研究成果についてご講演いただけることになりました。
どうぞ奮ってご参加ください。

＊この講演会は、「有機化学特論I（FE14131)」（化学類）の一部になります。

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Modular Silver-Phosphinidenide Clusters as Building Blocks for Multidimensional Metal-Organic Frameworks

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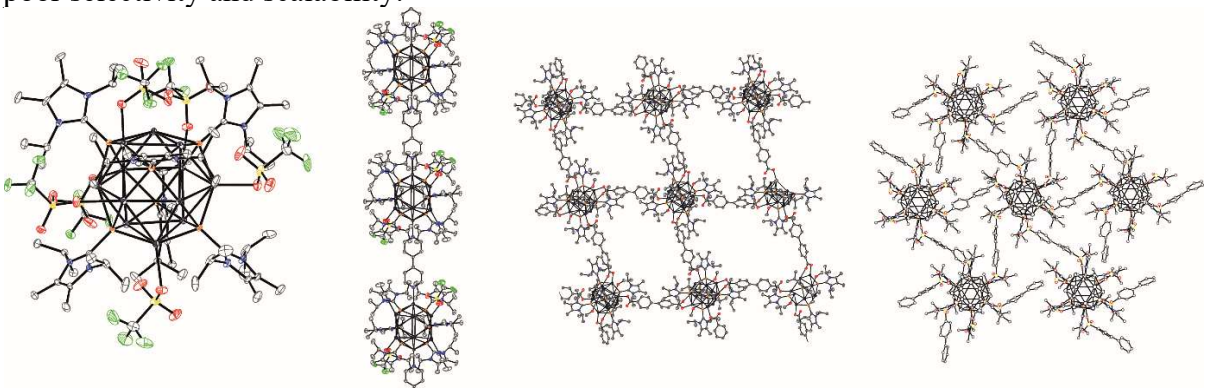
The supramolecular building block (SBB) approach enables the formation of metal-organic frameworks (MOFs) through the rational linkage of pre-organized metal-organic polyhedra (MOPs).[1] While the design of tailored MOPs and organic linkers has yielded topologically diverse and highly connected frameworks,[2] this strategy also enables the integration of functional nanoclusters into extended networks, allowing for fine-tuning of their properties.[3] Coinage-metal nanoclusters, particularly those based on silver, exhibit exceptional structural variability and tunable properties, making them promising candidates for applications in catalysis, sensing, and optoelectronics.[4,5] However, their broader integration into higher-dimensional frameworks has been hampered by synthetic challenges, including poor selectivity and scalability.



In this contribution, we report a new class of isolable, highly stable polyhedral silver-phosphinidenide complexes that exhibit anion-controlled architectures. These compounds are synthesized in a modular and scalable fashion, affording multigram yields with excellent reproducibility. Owing to their well-defined structures and accessible Ag coordination sites, these complexes serve as versatile SBBs for the construction of one-, two-, and three-dimensional MOF architectures. Assembly can be further directed via anion exchange using polytopic organic linkers. The synthesis, structural features, and connectivity-driven framework formation will be presented, along with selected inclusion properties of these promising materials.

Acknowledgment:

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Reference:

1. [1] S. R. Batten, S. M. Neville, D. R. Turner, Coordination Polymers. Design, Analysis and Application, RSC Publishing, Cambridge, 2009.
2. [2] A. Khobotov-Bakishev, L. Hernández-López, et al., Adv. Sci., 2022, 9, 2104753.
3. [3] R.-W. Huang, S.-Q. Zang, T. C. W. Mak, Nature Chem., 2017, 9, 689–697.
4. [4] O. Fuhr, S. Dehnen, D. Fenske, Chem. Soc. Rev., 2013, 42, 1871–1906.
5. [5] A. Desireddy, B. E. Conn, T. P. Bigioni, Nature, 2013, 501, 399–402.