Requests for Collaboration

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Research Interests

- Heterogeneous catalysis of coordination polymers
- Preparation of composite catalysts
- Bionanomaterial based on metalloproteins

Creative Achievements in The Application of New and Existing Science and Technology

(1) Heterogeneous catalysis using coordination polymers (MOFs)[1]

Heterogeneous catalysis of coordination polymers (metal–organic frameworks, MOFs) for degradation of toxic compounds was enhanced by systematic replacement of metal ions.

(2) Preparation of composite catalysts[2]

A composite photocatalyst was prepared by periodical and rational accumulation of metal nanoparticles and photosensitizers in a mesoporous material observed by the single-crystal X-ray structure analysis (Figure 1).

(3) Bionanomaterial based on metalloproteins[3–5]

Crystalline protein assembly was functionalized by metal complexes to obtain bionanomaterials including heterogeneous enzymes, adsorbents, and extracellular scaffolds for cellular signaling.

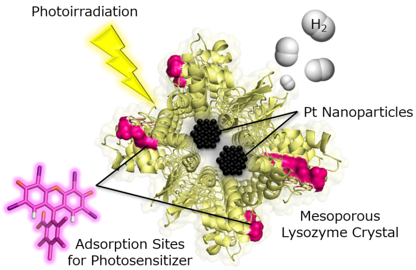

Figure 1. A composite photocatalytic system for H_2 evolution constructed in a mesoporous lysozyme crystal.

Technology (Product, Process, Device, Service etc.) That I Want to Request for Collaboration

- Enhancement of activity and durability of heterogeneous catalysts
- Synthesize and crystal structure analysis of metal complexes for catalysts
- *In-vivo* and *in-vitro* evaluation of artificial metalloproteins

A List of 5 Key Publications

1. Effect of surface acidity of cyano-bridged polynuclear metal complexes on catalytic activity for hydrolysis of organophosphates, H. Tabe, C. Terashima, Y. Yamada, ***Catal. Sci. Technol.*** DOI: 10.1039/C8CY01015C (2018).
2. Photocatalytic hydrogen evolution systems constructed in cross-linked porous protein crystals, H. Tabe, H. Takahashi, T. Shimoi, S. Abe, T. Ueno, Y. Yamada, ***Appl. Catal. B***, **237**, 1124–1129 (2018).
3. *In vivo* Crystal Engineering of Self-Fabricated Porous Protein Materials, S. Abe, H. Tabe, H. Ijiri, K. Yamashita, K. Hirata, K. Atsumi, T. Shimoi, M. Akai, H. Mori, S. Kitagawa, T. Ueno, ***ACS Nano***, **11**, 2410–2419 (2017).
4. Light-triggered CO Releasing from Extracellular Scaffold Constructed by *in-vivo* Protein Crystals, H. Tabe, T. Shimoi, M. Boudes, S. Abe, F. Coulibaly, S. Kitagawa, H. Mori, T. Ueno, ***Chem. Commun.***, **52**, 4545–4548 (2016).
5. Preparation of a Cross-Linked Porous Protein Crystal Containing Ru Carbonyl Complexes as a CO-releasing Material, H. Tabe, K. Fujita, S. Abe, M. Tsujimoto, T. Kuchimaru, S. Kizana-Kondoh, M. Takano, S. Kitagawa, T. Ueno, ***Inorg. Chem.***, **54**, 215–220 (2015).