

CURRICULUM VITAE

SATOSHI ABE, Ph.D.

School of Life Science and Technology, Tokyo Institute of Technology

4259 Nagatsuta-cho, Midori-ku, Yokohama, 226-8501, Japan

Tel/Fax: +81-45-924-5806

E-mail: saabe@bio.titech.ac.jp

Employment

May 2012 – Present

Assistant Professor School of Life Science and Technology, Tokyo Institute of Technology

Aug. 2008 – Apr. 2012

Postdoctoral Research Fellow Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University

Apr. 2008 – Jul. 2008

Postdoctoral Research Fellow Research Center for Materials Science, Nagoya University

Education

Mar. 2008

PhD Department of Chemistry

School of Science, Nagoya University, Japan

Supervisor: Prof. Yoshihito Watanabe

Organometalloproteins: Preparation, Structures, and Functions

Mar. 2003

B.S. Department of Chemistry

School of Science, Nagoya University, Japan

Jun. 2006 - Aug. 2006

Group of Prof. Dr. G. Erker, Munster University, Germany

Research Fields

Bioinorganic Chemistry, Biomaterial Chemistry, Protein Engineering, Protein Crystal Engineering

Awards

Mar. 2017	Special Young Lecture Award The 97th Spring Meeting of the Chemical Society of Japan
Apr. 2015	Presentation Award The 95th Spring Meeting of the Chemical Society of Japan
Nov. 2012	Poster Award The 6th Asian Biological Inorganic Chemistry Conference
Sep. 2010	Presentation Award 4th bio-inspired chemistry symposium
Feb. 2010	26th Inoue Research Aid for Young Scientists
Mar. 2007	Student Lecture Award The 87th Spring Meeting of the Chemical Society of Japan
Sep. 2006	Poster Award The 56th Symposium on Coordination Chemistry of Japan

Publications

Original Papers

1. C. Lu, B. Maity, X. Peng, N. Ito, **S. Abe**, X. Sheng, T. Ueno and D. Lu
Design of a gold clustering site in an engineered apo-ferritin cage
Commun. Chem., **2022**, 5, 39.
2. M. Taher, B. Maity, T. Nakane, **S. Abe**, T. Ueno and S. Mazumdar
Controlled Uptake of an Iridium Complex inside Engineered apo-Ferritin Nanocages: Study of Structure and Catalysis
Angew. Chem. Int. Ed. **2022**, 61, e202116623
3. **S. Abe**, T. T. Pham, H. Negishi, K. Yamashita, K. Hirata and T. Ueno
Design of an In-Cell Protein Crystal for the Environmentally Responsive Construction of a Supramolecular Filament
Angew. Chem. Int. Ed., **2021**, 60, 12341-12345.
4. T. K. Nguyen, **S. Abe**, M. Kasamatsu, B. Maity, K. Yamashita, K. Hirata, M. Kojima and T. Ueno
In-Cell Engineering of Protein Crystals with Nanoporous Structures for Promoting Cascade Reactions
ACS Appl. Nano Mater., **2021**, 4, 1672-1681.
5. Y. Hishikawa, B. Maity, N. Ito, **S. Abe**, D. Lu and T. Ueno
Design of Multinuclear Gold Binding Site at the Two-fold Symmetric Interface of the Ferritin Cage
Chem. Lett., **2020**, 49, 840-844.

6. S. Sato, M. Matsumura, T. Kadonosono, **S. Abe**, T. Ueno, H. Ueda, H. Nakamura
Site-Selective Protein Chemical Modification of Exposed Tyrosine Residues Using Tyrosine Click Reaction
Bioconjugate Chem. **2020**, 31, 1417-1424.
7. **S. Abe**, N. Ito, B. Maity, C. Lu, D. Lu and T. Ueno
Coordination design of cadmium ions at the 4-fold axis channel of the apo-ferritin cage
Dalton Trans., **2019**, 48, 9759-9764.
8. T. Hashimoto, Y. Ye, A. Matsuno, Y. Ohnishi, A. Kitamura, M. Kinjo, **S. Abe**, T. Ueno, M. Yao, T. Ogawa, T. Matsui and Y. Tanaka
Encapsulation of biomacromolecules by soaking and co-crystallization into porous protein crystals of hemocyanin
BBRC, **2019**, 509, 577-584.
9. T. K. Nguyen, H. Negishi, **S. Abe**, and T. Ueno
Construction of Supramolecular Nanotubes from Protein Crystals
Chem. Sci., **2019**, 10, 1046-1051.
10. H. Mori*, N. Oda, **S. Abe**, T. Ueno, W.L. Zhu, C. Pernstich, G. Pezzotti
Raman spectroscopy insight into Norovirus encapsulation in Bombyx mori cypovirus cubic microcrystals
Spectrochim. Acta A, **2018**, 203, 1988-1991.
11. H. Negishi, **S. Abe**, K. Yamashita, K. Hirata, K. Niwase, M. Boudes, F. Coulibaly, H. Mori and T. Ueno
Supramolecular protein cages constructed from a crystalline protein matrix
Chem. Commun., **2018**, 54, 1988-1991.
12. H. Tabe, H. Takahashi, T. Shimoi, **S. Abe**, T. Ueno and Y. Yamada
Photocatalytic hydrogen evolution systems constructed in cross-linked porous protein crystals
Appl. Catal., B, **2018**, 237, 1124-1129.
13. **S. Abe**, K. Atsumi, K. Yamashita, K. Hirata, H. Mori and T. Ueno
Structure of in cell protein crystals containing organometallic complexes
PCCP, **2018**, 20, 2986-2989.
14. B. Maity, **S. Abe**, and T. Ueno
Observation of gold sub-nanocluster nucleation within a crystalline protein cage
Nat. Commun., **2017**, 8, 1480.
15. **S. Abe**, H. Tabe, H. Ijiri, K. Yamashita, K. Hirata, K. Atsumi, T. Shimoi, M. Akai, H. Mori, S. Kitagawa and T. Ueno
Crystal Engineering of Self-Assembled Porous Protein Materials in Living Cells
ACS Nano **2017**, 11, 2410-2419.

16. B. Maity, K. Fukumori, **S. Abe** and T. Ueno
Immobilization of two organometallic complexes into a single cage to construct protein-based microcompartment
Chem. Commun., **2016**, 52, 5463-5466.
17. H. Tabe, T. Shimoi, M. Boudes, **S. Abe**, F. Coulibaly, S. Kitagawa, H. Mori, and T. Ueno
Photoactivatable CO Release from Engineered Protein Crystals to Modulate NF- κ B Activation
Chem. Commun., **2016**, 52, 4545-4548.
18. K. Fujita, Y. Tanaka, **S. Abe**, and T. Ueno
A Photoactive CO releasing protein cage for dose-regulated delivery in living cells
Angew. Chem. Int. Ed., **2016**, 55, 1056-1060.
19. **S. Abe**, H. Ijiri, H. Negishi, H. Yamanaka, K. Sasaki, K. Hirata, H. Mori, and T. Ueno
Design of Enzyme-Encapsulated Protein Containers by in Vivo Crystal Engineering
Adv. Mater. **2015**, 27, 7951-7956.
20. H. Nakajima, M. Kondo, T. Nakane, **S. Abe**, T. Nakao, Y. Watanabe, and T. Ueno
Construction of an enterobactin analogue with symmetrically arranged monomer subunits of ferritin
Chem. Commun. **2015**, 51, 16609-16612 (Selected as a Inside Front Cover)
21. H. Tabe, T. Shimoi, K. Fujita, **S. Abe**, H. Ijiri, M. Tsujimoto, T. Kuchimaru, S. Kizakai-Kondoh, H. Mori, S. Kitagawa and T. Ueno
Design of CO-releasing Extracellular Scaffold using in-vivo Protein Crystals
Chem. Lett., **2015**, 44, 342-344
22. H. Tabe, K. Fujita, **S. Abe**, M. Tsujimoto, T. Kuchimaru, S. Kizakai-Kondoh, M. Takano, S. Kitagawa and T. Ueno
Preparation of a Cross-linked Porous Protein Crystal containing Ru carbonyl complexes as a CO-releasing Extracellular Scaffold
Inorg. Chem., **2015**, 54, 215-220.
23. **S. Abe**, Y. Tokura, R. Pal, N. Komura, A. Imamura, K. Matsumoto, H. Ijiri, N. J. M. Sanghamitra, H. Tabe, H. Ando, M. Kiso, H. Mori, S. Kitagawa, and T. Ueno
Surface functionalization of protein crystals with carbohydrate using site-selective bioconjugation
Chem. Lett., **2015**, 44, 29-31.
24. K. Fujita, Y. Tanaka, T. Sho, S. Ozeki, **S. Abe**, T. Hikage, T. Kuchimaru, S. Kizakai-Kondoh, and T. Ueno
Intracellular CO Release from Composite of Ferritin and Ruthenium Carbonyl Complexes
J. Am. Chem. Soc., **2014**, 136, 16902-16908.
25. H. Tabe, **S. Abe**, T. Hikage, S. Kitagawa and T. Ueno

Porous Protein Crystals as Catalytic Vessels for Organometallic Complexes

Chem. Asian J., **2014**, 9, 1373-1378.

26. Z. Ke, **S. Abe**, T. Ueno, and K. Morokuma
Catalytic Mechanism in Artificial Metalloenzyme: AM/MM Study of Phenylacetylene Polymerization by Rhodium Complex Encapsulated in apo-Ferritin
J. Am. Chem. Soc., **2012**, 134, 15418-15429.
27. **S. Abe**, M. Tsujimoto, K. Yoneda, M. Ohba, T. Hikage, M. Takano, S. Kitagawa, and T. Ueno
Porous Protein Crystals as Reaction Vessels for Controlling Magnetic Properties of Nanoparticles
Small, **2012**, 8, 1314-1319.
28. Z. Ke, S. Abe, T. Ueno, and K. Morokuma
Rh-Catalyzed Polymerization of Phenylacetylene: Theoretical Studies of the Reaction Mechanism, Regioselectivity, and Stereoregularity
J. Am. Chem. Soc., **2011**, 133, 7926-7941.
29. Y. Takezawa, P. Bockmann, N. Sugi, Z. Wang, **S. Abe**, T. Murakami, T. Hikage, G. Erker, Y. Watanabe, S. Kitagawa, and T. Ueno
Incorporation of Organometallic Ru Complexes into Apo-Ferritin Cage”
Dalton, Trans., **2011**, 40, 2190-2195.
30. Z. Wang, Y. Takezawa, H. Aoyagi, **S. Abe**, T. Hikage, Y. Watanabe, S. Kitagawa, and T. Ueno,
Definite Coordination Arrangement of Organometallic Palladium complexes Accumulated on the Desired Interior Surface of apo-Ferritin
Chem. Commun., **2011**, 47, 170-172.
31. **S. Abe**, T. Hikage, Y. Watanabe, S. Kitagawa, and T. Ueno
Mechanism of Accumulation and Incorporation of Organometallic Pd Complexes into the Protein Nanocage of apo-Ferritin
Inorg. Chem., **2010**, 49, 6967-6973.
32. T. Ueno, **S. Abe**, T. Koshiyama, T. Ohki, T. Hikage, Y. Watanabe
Metal Ion Accumulation Induced by Hydrogen Bonds on Protein Surfaces: Mechanistic Insights into the Initiation Steps of Biomineralization Obtained using Porous Lysozyme Crystals Containing Rh(III) Ions
Chem. Eur. J., **2010**, 2730-2740. (**Highlighted Paper**)
33. M. Suzuki, M. Abe, T. Ueno, **S. Abe**, Y. Goto, Y. Toda, T. Akita, Y. Yamada and Y. Watanabe
Preparation and catalytic reaction of Au/Pd bimetallic nanoparticles in Apo-ferritin
Chem. Commun., **2009**, 4871-4873.
34. **S. Abe**, K. Hirata, T. Ueno, K. Morino, N. Shimizu, M. Yamamoto, M. Takata, E. Yashima and Y. Watanabe
Polymerization of Phenylacetylene by Rhodium Complexes within a Discrete Space of apo-

Ferritin

J. Am. Chem. Soc., **2009**, 131, 6958-6960. (**Highlighted in Nature Chemistry**)

35. T. Ueno, M. Abe, K. Hirata, **S. Abe**, M. Suzuki, N. Shimizu, M. Yamamoto, M. Takata, Y. Watanabe

Process of Accumulation of Metal Ions on the Interior Surface of apo-Ferritin: Crystal Structures of a Series of apo-Ferritins Containing Variable Quantities of Pd(II) Ions

J. Am. Chem. Soc., **2009**, 131, 5094-5100.

36. J. Niemeyer, **S. Abe**, T. Hikage, T. Ueno, G. Erker, and Y. Watanabe

Noncovalent insertion of ferrocenes into the protein shell of apo-ferritin

Chem. Commun., **2008**, 6519-6521

37. **S. Abe**, J. Niemeyer, M. Abe, Y. Takezawa, T. Ueno, T. Hikage, G. Erker, and Y. Watanabe, Control of the Coordination Structure of Organometallic Palladium Complexes in an apo-Ferritin Cage

J. Am. Chem. Soc., **2008**, 130, 10512-10514

38. Y. Satake, **S. Abe**, S. Okazaki, N. Ban, T. Hikage, T. Ueno, H. Nakajima, A. Suzuki, T. Yamane, H. Nishiyama, and Y. Watanabe

Incorporation of a Phebox Rhodium Complex into apo-Myoglobin Affords a Stable Organometallic Protein Showing Unprecedented Arrangement of the Complex in the Cavity

Organometallics, **2007**, 26, 4904-4908

39. **S. Abe**, T. Ueno, P. A. N. Reddy, S. Okazaki, T. Hikage, A. Suzuki, T. Yamane, H. Nakajima, and Y. Watanabe

Design and Structure Analysis of Artificial Metalloproteins: Selective Coordination of His64 to Copper Complexes with Square-Planar Structure in the apo-Myoglobin Scaffold

Inorg. Chem., **2007**, 46, 5137-5139. (**Selected as a Cover Picture**)

40. T. Ueno, T. Koshiyama, **S. Abe**, N. Yokoi, M. Ohashi, H. Nakajima, and Y. Watanabe

Design of artificial metalloenzymes using non-covalent insertion of a metal complex into a protein scaffold

J. Organomet. Chem., **2007**, 692, 142-147

Reviews

1. M. Kojima, **S. Abe** and T. Ueno

Engineering of protein crystals for use as solid biomaterials

Biomater. Sci., **2022**, 10, 354-367.

2. Y. Watanabe*, Y. Aiba, S. Ariyasu, and **S. Abe**

Molecular Design and Regulation of Metalloenzyme Activities through Two Novel Approaches:
Ferritin and P450s

Bull. Chem. Soc. Japan. **2020**, 93, 379-392.

3. **S. Abe**, B. Maity and T. Ueno

Functionalization of protein crystals with metal ions, complexes, and nanoparticles

Curr. Opin. Chem. Biol., **2018**, 43, 68-76.

4. **S. Abe**, B. Maity and T. Ueno

Design of a Confined Environment using a Protein Cage and Crystals in Development of
Biohybrid Materials

Chem. Commun., **2016**, 52, 6496-6512. (Selected as a Inside Cover)

5. **S. Abe** and T. Ueno

Design of Protein Crystals in the Development of Solid Biomaterials

RSC Adv., **2015**, 5, 21366-21375.

6. T. Ueno, N. Yokoi, **S. Abe**, and Y. Watanabe

Crystal structure base design of functional metal/protein hybrids

J. Inorg. Biochem., **2007**, 101, 1667-1675

7. T. Ueno, **S. Abe**, N. Yokoi, and Y. Watanabe

Coordination Design of Artificial Metalloproteins Utilizing Protein Vacant Space

Coord. Chem. Rev., **2007**, 251, 2717-2731

Book Chapters, 解説

1. T. Ueno and **S. Abe**

Catalytic Reactions Promoted in Protein Assembly Cages

Coordination Chemistry in Protein Cages; T. Ueno, Y. Watanabe (Eds), Wiley-VCH, **2013**,
Chapter 7, 175-202.

2. T. Ueno and **S. Abe**,

Coordination of Organometallic Palladium Complexes in Apoferritin

Encyclopedia of Metalloproteins, Springer, **2013**, 1641-1648.

3. **S. Abe**, T. Ueno and Y. Watanabe,

Artificial Metalloproteins Exploiting Vacant Space: Preparation, Structures, and Functions,

Topics in Organometallic Chemistry on Bio-inspired catalysis; T. R. Ward (Ed), **2009**, Chapter 2,
25-44