Publications of Seigo Shima

(February 1, 2012)

Of the 97 publications 73 are found in the web of knowledge. h-index = 27

Theses (3)
Original Publications (59)
Reviews (28)
Miscellaneous (7)

Theses (3)

Shima, S. (1983) Effect of ammonium ion on the nitrogenase activity of *Azolla*, Bachelor thesis, Osaka Prefecture University, Osaka, Japan.

Shima, S (1985) Microbial ecology of *Bradyrhizobium japonicum* strains, Master thesis, Osaka Prefecture University, Osaka, Japan.

Shima, S. (1991) Genetical and biochemical study on cellulases from mesophilic Clostridia, Ph.D. thesis, University of Tokyo, Tokyo, Japan.

Original Publications (58)

1. **Schick, M., Xie, X., Ataka, K., Kahnt, J., Linne, U. and Shima, S. (2012)** Biosynthesis of the iron-guanylylpyridinol cofactor of [Fe]-hydrogenase in methanogenic archaea as elucidated by stable-isotope labeling. *J. Am. Chem. Soc.* In press (DOI: 10.1021/ja211594m).

2. **Shima, S., Krueger, M., Weinert, T. Demmer, U., Kahnt, J., Thauer, R.K. & Ermler, U. (2012)** Structure of a methyl-coenzyme M reductase from Black Sea mats that oxidize methane anaerobically. *Nature* 481, 98–101.

3. **Shima, S., Schick, M., Kahnt, J., Ataka, K., Steinbach, K. & Linne, U. (2012)** Evidence for acyl–iron ligation in the active site of [Fe]-hydrogenase provided by mass spectrometry and infrared spectroscopy. *Dalton Trans.* 41, 767–771.

4. **Basen, M., Krüger, M., Milucka, J., Kuever, J., Kahnt, J., Grundmann, O., Meyerdierks, A., Widdel, F. & Shima, S. (2011)** Bacterial enzymes for dissimilatory sulfate reduction in a marine microbial mat (Black Sea) mediating anaerobic oxidation of methane. *Environ. Microbiol.* 13, 1370–1379.

5. **Shima, S. & Ataka, K. (2011)** Isocyanides inhibit [Fe]-hydrogenase with very high affinity. *FEBS Lett.* 585, 353-356.

6. **Shima, S., Vogt, S., Göbels, A. & Bill E. (2010)** Iron-chromophore circular dichroism of [Fe]-hydrogenase: the conformational change required for H_2 activation. *Angew. Chem. Int. Ed.* 49, 9917–9921.

7. **Salomone-Stagni, M., Stellato, F., C. Matthew Whaley, M., Vogt, S., Morante, S.,Shima, S., Rauchfuss, T.B. & Meyer-Klaucke, W. (2010)** The iron-site structure of [Fe]-hydrogenase and model systems: an X-ray absorption near edge spectroscopy study. *Dalton Trans. 39*, 3057–3064.

8. **Ceh, K., Demmer, U., Warkentin, E., Moll, J., Thauer, R.K., Shima, S. & Ermler, U. (2009)** Structural basis of the hydride transfer mechanism in F_{420} dependent methylene-tetrahydromethanopterin dehydrogenase. *Biochemistry* 48, 10098–10105.

9. **Hiromoto, T., Warkentin, E., Moll, J., Ermler, U. & Shima, S. (2009)** The crystal structure of an [Fe]-hydrogenase substrate complex reveals the framework for H_2-activation. *Angew. Chem. Int. Ed.* 48, 6457-6460.

10. **Hiromoto, T., Ataka, K., Pilak, O., Vogt, S., Stagni, M.S., Meyer-Klaucke, W., Warkentin, E., Thauer, R.K., Shima, S. & Ermler, U. (2009)** The crystal structure of C176A mutated [Fe]-hydrogenase suggests an acyl-iron ligation in the active site iron complex. *FEBS Lett.* 583, 585-590.

11. **Ettwig, K.F., Shima, S., van de Pas-Schoonen, K.T., Kahnt, J., Medema, M., op den Camp, H.J.M. Jetten, M.S.M. & Strous, M (2008)** Denitrifying bacteria oxidize methane in the absence of archaea. *Environ. Microbiol.* 10. 3164-3173.

12. **Shima, S., Pilak O., Vogt, S., Schick, M., Stagni, M.S., Meyer-Klaucke, W., Warkentin, E., Thauer, R.K., & Ermler, U. (2008)** The crystal structure of [Fe]-hydrogenase reveals the geometry of the active site. *Science*, 321, 572-575.

13. **Mayr, S., Latkoczy C., Krüger, M., Günther, D., Shima, S., Thauer, R.K., Widdel, F. and Jaun, B. (2008)** The structure of a F_{430} variant from archaea associated with anaerobic oxidation of methane. *J. Am. Chem. Soc.*, 130, 10758-10767.

14. **Guo, Y., Wang, H., Xiao, Y., Vogt, S., Thauer, R.K., Shima, S., Volkers, P.I., Rauchfuss, T.B., Pelmentschikov, V., Case, D.A., Alp, E.E., Sturhahn, W., Yoda, Y. & Cramer, S.P. (2008)** Characterization of the Fe site in the iron-sulfur-cluster-free hydrogenase (Hmd) and of a model compound via nuclear resonance vibrational spectroscopy (NRVS). *Inorg. Chem.*, 47, 3969–3977.

15. **Vogt, S., Lyon, E.J., Shima, S. & Thauer, R.K. (2008)** The exchange activities of [Fe]- hydrogenase (iron-sulfurcluster- free hydrogenase) from methanogenic archaea in comparison with the exchange activities of [FeFe] and [NiFe] hydrogenases. *J. Biol. Inorg. Chem.* 13, 97-106.

16. **Seedorf, H., Hagemeier, C.H., Shima, S., Thauer, R.K., Warkentin, E. & Ermler, U. (2007)** Structure of coenzyme $F_{420}H_2$ oxidase (FprA), a di-iron flavoprotein from methanogenic archaea catalyzing the reduction of O_2 to H_2O. *FEBS J.* 274, 1588-1599.

17. **Kahnt, J, Buchenau, B., Mahlert, F., Krüger, M., Shima, S. & Thauer, R.K. (2007)** Post-translational modifications in the active site region of methyl-coenzyme M reductase from methanogenic and methanotrophic archaea. *FEBS J.* 274, 4913-4921.

18. **Korbas, M., Meyer-Klaucke, W., Vogt, S., Lyon, E. J. Thauer, R. K. & Shima, S. (2006)** The iron-sulfur cluster free hydrogenase (Hmd) is a metalloenzyme with a novel iron binding motif. *J. Biol. Chem.* 281, 30804-30813.

19. **Pilak, O., Mamat, B., Vogt, S., Hagemeier, C.H., Thauer, R.K., Shima, S., Vonrhein, C., Warkentin, E. & Ermler, U. (2006)** The crystal structure of the apoenzyme of the iron-sulfur-cluster-free hydrogenase (Hmd). *J. Mol. Biol.* 358: 798-809.

20. **Acharya, P., Warkentin, E., Ermler, U., Thauer, R.K. & Shima, S. (2006)** The structure of formylmethanofuran:tetrahydromethanopterin formyltransferase in complex with its coenzymes. *J. Mol. Biol.* 357: 870-879.

21. **Shima, S., Lyon, E. J., Thauer, R. K. Mienert, B. and Bill, E (2005)** Mössbauer Studies of the Iron-Sulfur-Cluster-Free Hydrogenase (Hmd): The Electronic State of the Mononuclear Fe Active Site. *J. Am. Chem. Soc.* 127, 10430-10435.

22. **Aufhammer, S. W., Warkentin, E., Ermler, U., Hagemeier, C. H., Thauer, R. K. & Shima, S. (2005)** Crystal structure of methylenetetrahydro-methanopterin reductase (Mer) in complex with coenzyme F_{420}: Architecture of the F_{420}/FMN binding site of enzymes within the non-prolyl *cis*-peptide containing bacterial luciferase family. *Protein Science* 14, 1840-1849.

23. **Warkentin, E., Hagemeier, C.H., Shima, S., Thauer R.K. & Ermler, U. (2005)** The structure of F_{420}-dependent methylenetetrahydro- methanopterin dehydrogenase: a crystallographic superstructure of the selenomethionine-labelled protein crystal structure. *Acta Crystallog. Sect. D.* 61: 198-202.

24. **Sakasegawa, S., Hagemeier, S. C., Thauer R. K. Essen, L.-O. & Shima, S. (2004)** Structural and functional analysis of the *gps*A gene product of *Archaeoglobus fulgidus*: A glycerol-3-phosphate dehydrogenase with unusual $NADP^+$ preference. *Protein Science* 13, 3162-3171.

25. **Lyon, E. J., Shima, S., Boecher, R., Thauer, R. K., Grevels, F.-W., Bill, E., Roseboom, W. Albracht, S. P. J. (2004)** Carbon monoxide as an intrinsic ligand to iron in the active site of the iron-sulfur cluster free hydrogenase (Hmd) as revealed by infrared spectroscopy. *J. Am. Chem. Soc*. 126, 14239-14248.

26. **Seedorf, H., Dreisbach, A., Hedderich, R., Shima, S. & Thauer, R.K. (2004)** $F_{420}H_2$-oxidase (FprA) from *Methanobrevibacter arboriphilus*, a novel coenzyme F_{420} dependent enzyme involved in O_2 detoxification. *Arch. Microbiol*. 182, 126-137.

27. **Shima, S., Lyon, E. J., Sordel-Klippert, Kauß, M., Kahnt, J., Thauer, R. K., Steinbach, K., Xie, X., Verdier, L. & Griesinger, C. (2004)** The cofactor of the iron-sulfur cluster free hydrogenase Hmd: structure of the light-inactivation product. *Angew. Chemie Int. Ed.* 43, 2547-2551.

28. **Aufhammer, S., Warkentin, E., Berk, H., Shima, S., Thauer, R.K. & Ermler, U. (2004)** Coenzyme binding in F_{420}-dependent alcohol dehydrogenase, a member of the bacterial luciferase family. *Structure*, 12, 361-370.

29. **Lyon, E.J., Shima, S., Buurman, G., Chowdhuri, S., Batschauer, A., Steinbach, K., Thauer, R.K. (2004)** UV-A/blue light inactivation of the "metal-free" hydrogenase (Hmd) from methanogenic archaea: the enzyme appears to contain functional iron after all. *Eur. J. Biochem*., 271, 195-204.

30. **Krüger, M., Meyerdierks, A., Glöckner, F.O., Amann, R., Widdel, F., Kube, M., Reinhardt, R., Kahnt, J., Böcher, R., Thauer, R.K. & Shima, S. (2003)** An conspicuous nickel protein in microbial mats that oxidize methane anaerobically. *Nature*, 426 (6968): 878-881.

31. **Hagemeier, C.H., Shima, S., Thauer, R.K., Bourenkov, G., Bartunik, H.D. & Ermler, U. (2003)** Coenzyme F_{420}-dependent methylenetetrahydromethanopterin dehydrogenase (Mtd) from Methanopyrus: A methanogenic enzyme with an unusual quarternary structure. *J. Mol. Biol.* 332, 1047-1057.

32. **Hagemeier, C.H., Shima, S., Warkentin, E., Thauer, R.K. & Ermler, U. (2003)** Coenzyme F_{420} dependent methylenetetrahydromethanopterin dehydrogenase from *Methanopyrus kandleri*: the selenomethionine- labelled and non-labelled enzyme crystallized in two different forms. *Acta Crystallog. Sect. D* 59, 1635-1655.

33. **Mamat, B., Roth, A., Grimm,, C., Ermler, U., Tziatzios, C., Schubert, D., Thauer, R.K. & Shima, S. (2002)** Crystal structures and enzymatic properties of three formyltransferases from archaea: Environmental adaptation and evolutionary relationship. *Protein Science* 11, 2168-2178.

34. **Warkentin, E., Mamat, B., Sordel-Klippert, M., Wicke, M., Thauer, R.K., Iwata, M., Iwata, S., Ermler, U. & Shima, S. (2001)** Structures of $F_{420}H_2$:$NADP^+$ oxidoreductase with and without its substrates bound. *EMBO J.* 20, 6561-6569.

35. **Shima, S., Sordel-Klippert, M., Brioukhanov, A., Netrusov, A., Linder, D. and Thauer, R. K. (2001)** Characterization of heme-dependent catalase from Methanobrevibacter arboriphilus. *Appl. Environ. Microbiol.* 67, 3041-3045.

36. **Grabarse, W., Mahlert, F., Duin, E. C., Goubeaud, M., Shima, S., Thauer, R. K., Lamzin, V. and Ermler, U. (2001)** On the mechanism of biological methane formation: Structural evidence for conformational changes in methyl-coenzyme M reductase upon substrate binding. *J. Mol. Biol.* 309, 315-330.

37. **Buurman, G., Shima, S. & Thauer, R.K. (2000)** The metal-free hydrogenase from methanogenic archaea: Evidence for a bound cofactor. *FEBS Lett.* 485, 200-204.

38. **Shima, S., Thauer, R.K., Ermler, U., Durchschlag, H., Tziatzios, C. & Schubert, D. (2000)** A mutation affecting the association equilibrium of formyltransferase from the hyperthermophilic *Methanopyrus kandleri* and its influence on the enzyme´s activity and thermostability. *Eur. J. Biochem.* 267, 6619-6623.

39. **Grabarse, W., Mahlert, F., Shima, S., Thauer, R.K. & Ermler, U. (2000)** Comparison of three methyl coenzyme M reductase from phylogenetically distant organisms: Unusual amino acid modification, conservation and adaptation. *J. Mol. Biol.* 303, 329-344.

40. **Brioukhanov, A., Netrusov, A., Sordel, M., Thauer, R.K. & Shima, S. (2000)** Protection of *Methanosarcina barkeri* against oxidative stress: identification and characterization of an iron superoxide dismutase. *Arch. Microbiol.* 174, 213-216.

41. **Shima, S., Warkentin, E., Grabarse, W., Sordel, M., Wicke, M., Thauer, R.K.**

& Ermler, U. (2000) Structure of coenzyme F_{420} dependent methylenetetrahydromethanopterin reductase from two methanogenic archaea. *J. Mol. Biol.* 300, 935-950.

42. **Selmer, T., Kahnt, J., Goubeaud, M., Shima, S., Grabarse, W., Ermler, U & Thauer, R.K. (2000) On the biosynthesis of methylated aminoacids in the active site region of methyl-coenzyme M reductase. *J. Biol. Chem.* 275. 3755-3760.**

43. **Grabarse, W., Vaupel, M., Vorholt, J.A., Shima, S., Thauer, R.K. Wittershagen, A., Bourenkov, G., Bartunik, H.D. & Ermler, U. (1999)** The crystal structure of methenyltetrahydromethanopterin cyclohydrolase from the hyperthermophilic archaeon *Methanopyrus kandleri*. *Struct. Fold. Des.* 7, 1257-1268.

44. **Shima S., Netrusov, A., Sordel, M., Wicke, M., Hartmann, G.C. & Thauer, R.K. (1999)** Purification, characterization, and primary structure of a monofunctional catalase from *Methanosarcina barkeri*. *Arch. Microbiol.*, 171, 317-323.

45. **Shima, S., Tziatzios, C., Schubert, D., Fukada, H., Takahashi, K., Ermler, U. & Thauer, R.K. (1998)** Lyotropic-salt-induced changes in monomer/dimer/tetramer association equilibrium of formyltransferase from the hyperthermophilic *Methanopyrus kandleri* in relation to the activity and thermostability of the enzyme. *Eur. J. Biochem.* 258, 85-92.

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47. **Ermler, U., Grabarse, W., Shima, S., Goubeaud, M. & Thauer, R.K. (1997)** Crystal structure of methyl-coenzyme M reductase: the key enzyme of biological methane formation. *Science* 278, 1457-1462.

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51. **Kunow, J., Shima, S., Vorholt, J. & Thauer, R.K. (1996)** Primary structure and properties of the formyltransferase from the mesophilic *Methanosarcina barkeri*: Comparison with the enzymes from thermophilic and hyperthermophilic methanogens. *Arch. Microbiol.* 165, 97-105.

52. **Shima, S., Weiss, D. & Thauer, R.K. (1995)** Formylmethanofuran: tetrahydromethanopterin formyltransferase (Ftr) from the hyperthermophilic *Methanopyrus kandleri*: Cloning, sequencing and functional expression of the *ftr* gene and one step purification of the enzyme overproduced in *Escherichia coli*. *Eur. J. Biochem.* 230, 906-913.

53. **Shima, S., Yanagi, M. & H. Saiki (1994)** The phylogenetic position of *Hydrogenobacter acidophilus* based on 16S rRNA sequence analysis. *FEMS Microbiol. Let.* 119, 119-122.

54. **Shima, S. & Suzuki, K. (1993)** *Hydrogenobacter acidophilus* sp. nov., a thermophilic, aerobic, hydrogen-oxidizing bacterium requiring elemental sulfur for growth. *Int. J. Syst. Bacteriol.* 43, 703-708.

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57. **Shima, S., Igarashi, Y. & Kodama, T. (1991)** Molecular cloning of a new endoglucanase gene from *Clostridium cellulolyticum* and its expression in *Escherichia coli*. *Appl. Microbiol. Biotechnol.* 35, 233-236.

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59. **Ozawa T., Shima, S. & Yamaguchi, M. (1988)** Soil aggregate as a favorable habitat for *Bradyrhizobium japonicum* strains. *Soil Sci. Plant Nutr.* 34, 605-608.

Reviews (28)

1. **Shima, S. & Ermler U. (2011)** Structure and function of [Fe]-hydrogenase and its iron-guanylylpyridinol (FeGP) cofactor. *Eur. J. Inorg. Chem.* 2011, 963-972.

2. **Shima, S., Schick, M. & Tamura, H. (2011)** Preparation of [Fe]-hydrogenase from methanogenic archaea. *Methods Enzymol*. 494, 119-137.

3. **Thauer, R.K., Kaster, A.-K., Goenrich, M., Schick, M., Hiromoto, T. & Shima, S. (2010)** Hydrogenases from methanogenic archaea, nickel, a novel cofactor and H_2-storage. *Ann. Rev. Biochem.* 79: 507–536.

4. **Shima, S., Thauer, R.K. & Ermler, U. (2009)** Carbon monoxide as intrinsic ligands to iron in the active site of [Fe]-hydrogenase. In *Metal-carbon bonds in enzymes and cofactors*, Vol. 6 of *Metal Ions in Life Sciences* (Sigel, A., Sigel, H., Sigel, R.K.O., eds). John Wiley & Sons, Ltd, Chichester, UK, pp 219-240.

5. **Shima, S (2008)** The structure of the [Fe]-hydrogenase and the convergent evolution of the active site of hydrogenases. *Seikagaku,* 80, 846-849 (in Japanese).

6. **Shima, S (2008)** Functions of methyl-coenzyme M reductase in production and degradation of methane, pp. 182-183. In *Applied Microbiology* (Kumagai, H., Kato, N., Murata, K. & Sakai, Y., eds) Asakura Shoten, Tokyo, Japan (in Japanese).

7. **Thauer, R.K. & Shima, S. (2008)** Methane as fuel for anaerobic microorganisms. *Ann. NY Acad. Sci.* 1125: 158-170.

8. **Shima, S. & Thauer, R.K. (2007)** A third type of hydrogenase catalyzing H_2 activation. *Chem. Rec. 7*, 37-46.

9. **Thauer R.K. & Shima, S. (2007)** Methyl-coenzyme M reductase in methanogenic and methanotrophic archaea. In Archaea (Garrett, R. & Klenk, H.-P., eds) Blackwell Publishing, Inc. Malden, USA, pp 275-283.

10. **Thauer R.K. & Shima, S. (2006)** Methane and microbes. *Nature* 440: 878-879.

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12. **Shima, S. & Thauer, R.K. (2006)** Anaerobic methane oxidation by archaea: a biochemical approach. *Bioscience and Industry*, 64:23-26 (in Japanese).

13. **Shima, S. & Thauer, R.K. (2005)** Methyl-coenzyme M reductase (MCR) and

the anaerobic oxidation of methane (AOM) in methanotrophic archaea. *Curr. Opin. Microbiol. 8*, 643-648.

14. **Shima, S., Thauer, R.K. & Ermler, U. (2004)** Hyperthermophilic and salt-dependent formyltransferase from *Methanopyrus kandleri*. *Biochem. Soc. Trans*. 32, 269-272.

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16. **Shima, S. (2002)** Energy metabolism of methanogens, pp. 325-333. in Great development of microorganisms (Imanaka, T., Ed.). NTS inc., Tokyo (in Japanese).

17. **Grabarse, W., Shima, S., Mahlert, F., Duin, E.C. & Thauer, R.K. & Ermler, U. (2001)** Methyl-coenzyme M reductase, pp. 897-914. In *Handbook of Metalloproteins* (Wieghardt, K., Huber, R., Poulos, T.L., Messerschmidt, A.). John Wiley & sons.

18. **Shima, S. & Thauer R.K. (2001)** Tetrahydromethanopterin specific enzymes from *Methanopyrus kandleri*. *Methods Enzymol.* 331, 317-353.

19. **Ermler, U., Grabarse, W., Shima, S., Goubeaud, M. & Thauer, R.K. (1998)** Active sites of transition metal enzymes with focus on nickel. *Current Opinions in Structural biology*, 8 749-758.

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22. **Shima, S. (1998)** Mechanism of biological methane formation: Structure and function of methyl-coenzyme M reductase. *Protein, Nucleic acid and Enzyme* 43, 1461-1467 (in Japanese).

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26. **Shima, S. (1990)** Application of energy-conversion enzymes for hydrogen production and electrodes of fuel cells. *Energy forum* No. 432, 112 (in Japanese).

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Miscellaneous (7)

1. **Shima, S. (2011)** Application of the function of [Fe]-hydrogenase. Kagaku Keizai 58, 93-94 (in Japanese).

Reports of Central Research Institute of Electric Power Industry (in Japanese with English abstract)

1. **Shima, S. (1993)** Purification of the cytoplasmic hydrogenase of thermoacidophilic aerobic hydrogen-oxidizing bacterium, strain 3H-1, and characterization of the strain. (Research Report U92048).

2. **Shima, S. (1991)** Isolation of hydrogen bacteria growing in extreme environments and characterization of their hydrogenases. (Research Report: U91009).

3. **Shima, S., Watanabe, Y., Saiki, H. & Kiyono, M. (1990)** Microbial CO2 fixation -1- its effect on total emission of greenhouse effect gases. (Research Report U90020).

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5. **Shima, S. (1988)** Cellulase Secretion from transformed *Escherichia coli* JM109. (Research Report U88055).

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