

Dr. Kenichi Morigaki's Curricurum Vitae

Contact Information

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Education

1993-1998	Department of Chemistry, Swiss Federal Institute of Technology-Zurich (Zurich, Switzerland) Ph.D.
1991-1993	Department of Chemical Engineering, University of Tokyo (Tokyo, Japan) M.Eng.
1986-1991	Department of Industrial Chemistry, University of Tokyo (Tokyo, Japan) B.Eng.

Professional Experience

2023-present	Professor, Kobe University
2009-2023	Associate Professor, Kobe University
2007-2009	Senior Research Scientist, AIST (Ikeda, Japan)
2002-2007	Research Scientist, AIST (Ikeda, Japan)
2000-2002	Postdoctoral fellow, Department of Material Science, Swiss Federal Institute of Technology-Zurich (Zurich, Switzerland)
1998-2000	Postdoctoral fellow, Max-Planck-Institute of Polymer Research (Mainz, Germany)

Research Areas

- 1) Model systems of the biological membrane
- 2) Integration of biological molecules on the solid surface by the self-assembly (bottom-up) and micro-fabrication (top-down)
- 3) Reconstitution and functional analyses of the membrane proteins
- 4) Single-molecule biophysics
- 5) Development of membrane-based biochips and biosensors

List of Publication

1. Original papers

1. Meredith, S. A., Kusunoki, Y., Connell, S. D., Morigaki, K., Evans, S. D., Adams, P. G. "Self-quenching behavior of a fluorescent probe incorporated within lipid membranes explored using electrophoresis and fluorescence lifetime imaging microscopy", *J. Phys. Chem. B* **127** (8), 1715-1727, (2023)
2. Tanimoto, Y., Yoshimura, Y., Hayashi, F., Morigaki, K. "Retarded diffusion and confinement of membrane-bound molecules in a patterned hybrid membrane of phospholipid bilayers and monolayers", *J. Phys. Chem. B* **127** (2), 520-527, (2023)
3. Hancock, A. M., Swainsbury, D. J. K., Meredith, S. A., Morigaki, K., Hunter, C. N., Adams, P. G. "Enhancing the spectral range of plant and bacterial Light-Harvesting pigment-protein complexes with various synthetic chromophores incorporated into lipid vesicles", *J. Photochem. Photobiol., B* **237** 112585, (2022)
4. Komatsu, R., Tanimoto, Y., Ando, K., Yasuhara, K., Iwasaki, Y., Hayashi, F., Morigaki, K. "Nanofluidic model membrane for the single molecule observation of membrane proteins", *Langmuir* **38** (23), 7234-7243, (2022)
5. Nagai, R., Sugimachi, A., Tanimoto, Y., Suzuki, K. G. N., Hayashi, F., Weikert, D., Gmeiner, P., Kasai, R. S., Morigaki, K. "Functional reconstitution of dopamine D2 receptor into a supported model membrane in a nanometric confinement", *Adv. Biology* **5** 2100636, (2021)
6. Nagai, R., Sugimachi, A., Tanimoto, Y., Suzuki, K. G. N., Hayashi, F., Kasai, R. S., Morigaki, K. "Reconstitution of membrane proteins into a model biological membrane", *IEEJ Transaction on Electronics, Information and Systems* **141** (12), 1340-1343, (2021)
7. Meredith, S. A., Yoneda, T., Hancock, A. M., Connell, S. D., Evans, S. D., Morigaki, K., Adams, P. G. "Model lipid membranes assembled from natural plant thylakoids into 2-D microarray patterns as a platform to assess the organization and photophysics of light-harvesting proteins", *Small* **17** (14), 2006608, (2021)
8. Odagaki, S.-I., Maekawa, S., Hayashi, F., Suzuki, T., Morigaki, K. "The effects of phospholipids and fatty acids on the oligomer formation of NAP-22", *Neurosci. Lett.* **736** 135288, (2020)
9. Yoneda, T., Tanimoto, Y., Takagi, D., Morigaki, K. "Photosynthetic model membranes of natural plant thylakoid embedded in a patterned polymeric lipid bilayer", *Langmuir* **36** (21), 5863-5871, (2020)
10. Kaneshige, Y., Hayashi, F., Morigaki, K., Tanimoto, Y., Yamashita, H., Fuji, M., Awazu, A. "Affinity of rhodopsin to raft enables the aligned oligomer formation

- from dimers: Coarse-grained molecular dynamics simulation of disk membranes", *PLoS One* **15** (2), e0226123, (2020)
- 11. Tamura, F., Tanimoto, Y., Nagai, R., Hayashi, F., Morigaki, K. "Self-spreading of phospholipid bilayer in a patterned framework of polymeric bilayer", *Langmuir* **35** 14696-14703, (2019)
 - 12. Nomura, K., Yamaguchi, T., Mori, S., Fujikawa, K., Nishiyama, K.-i., Shimanouchi, T., Tanimoto, Y., Morigaki, K., Shimamoto, K. "Alteration of membrane physicochemical properties by two factors for membrane protein integration", *Biophys. J.* **117** (1), 99-110, (2019)
 - 13. Hayashi, F., Saito, N., Tanimoto, Y., Okada, K., Morigaki, K., Seno, K., Maekawa, S. "Raftophilic rhodopsin clusters offer stochastic platforms for G protein signalling in retinal discs", *Commun. Biol.* **2** 209, (2019)
 - 14. Tanabe, M., Ando, K., Komatsu, R., Morigaki, K. "Nanofluidic biosensor created by bonding patterned model cell membrane and silicone elastomer with silica nanoparticles", *Small* **14** (49), 1802804, (2018)
 - 15. Nishimura, T., Tamura, F., Kobayashi, S., Tanimoto, Y., Hayashi, F., Sudo, Y., Iwasaki, Y., Morigaki, K. "Hybrid model membrane combining micropatterned lipid bilayer and hydrophilic polymer brush", *Langmuir* **33** (23), 5752-5759, (2017)
 - 16. Kinoshita, M., Suzuki, K. G. N., Matsumori, N., Takada, M., Ano, H., Morigaki, K., Abe, M., Makino, A., Kobayashi, T., Hirosawa, K. M., Fujiwara, T., Kusumi, A., Murata, M. "Raft-based sphingomyelin interactions revealed by new fluorescent sphingomyelin analogs", *J. Cell Biol.* **216** (4), 1183-1204, (2017)
 - 17. Nomura, K., Tanimoto, Y., Hayashi, F., Harada, E., Shan, X.-Y., Shionyu, M., Hijikata, A., Shirai, T., Morigaki, K., Shimamoto, K. "The role of the Prod1 membrane anchor in newt limb regeneration", *Angew. Chem. Int. Ed.* **56** (1), 270-274, (2017)
 - 18. Ando, K., Tanabe, M., Morigaki, K. "Nanometric gap structure with fluid lipid bilayer for the selective transport and detection of biological molecules", *Langmuir* **32** (31), 7958-7964, (2016)
 - 19. Tanimoto, Y., Okada, K., Hayashi, F., Morigaki, K. "Evaluating the raftophilicity of rhodopsin photoreceptor in a patterned model membrane", *Biophys. J.* **109** (11), 2307-2316, (2015)
 - 20. Sasahara, K., Morigaki, K., Mori, Y. "Uptake of raft components into amyloid beta-peptide aggregates and membrane damage", *Anal. Biochem.* **481** (1), 18-26, (2015)
 - 21. Kuroda, K., Miyoshi, H., Fujii, S., Hirai, T., Takahara, A., Nakao, A., Iwasaki, Y., Morigaki, K., Ishihara, K., Yusa, S. "Poly(dimethylsiloxane) (PDMS) surface

- patterning by biocompatible photo-crosslinking block copolymers", *RSC Adv.* **5** (58), 46686-46693, (2015)
- 22. Okada, F., Morigaki, K. "Micropatterned model membrane with quantitatively controlled separation of lipid phases", *RSC Adv.* **5** 1507-1513, (2015)
 - 23. Sasahara, K., Morigaki, K., Shinya, K. "Amyloid aggregation and deposition of human islet amyloid polypeptide at membrane interfaces", *FEBS J.* **281** (11), 2597-2612, (2014)
 - 24. Fujiwara, M., Shiokawa, K., Kubota, T., Morigaki, K. "Preparation of calcium carbonate microparticles containing organic fluorescent molecules from vaterite", *Adv. Powder Technol.* **25** (3), 1147-1154, (2014)
 - 25. Kanemura, E., Goto, T., Tatsu, Y., Imaishi, H., Morigaki, K. "Parallel assay of inkjet-printed cytochrome P450", *Anal. Methods* **6** (7), 2117-2124, (2014)
 - 26. Yamada, M., Imaishi, H., Morigaki, K. "Microarrays of phospholipid bilayers generated by inkjet-printing", *Langmuir* **29** (21), 6404-6408, (2013)
 - 27. Sasahara, K., Morigaki, K., Shinya, K. "Effects of membrane interaction and aggregation of amyloid β -peptide on lipid mobility and membrane domain structure", *Phys. Chem. Chem. Phys.* **15** (23), 8929-8939, (2013)
 - 28. Morigaki, K., Mizutani, K., Saito, M., Okazaki, T., Nakajima, Y., Tatsu, Y., Imaishi, H. "Surface functionalization of a polymeric lipid bilayer for coupling a model biological membrane with molecules, cells, and microstructures", *Langmuir* **29** (8), 2722-2730, (2013)
 - 29. Sasahara, K., Morigaki, K., Okazaki, T., Hamada, D. "Binding of islet amyloid polypeptide to supported lipid bilayers and amyloid aggregation at the membranes", *Biochemistry* **51** (35), 6908–6919, (2012)
 - 30. Watanabe, K., Miyazaki, R., Terakado, G., Okazaki, T., Morigaki, K., Kano, H. "Localized surface plasmon microscopy of submicron domain structures of mixed lipid bilayers", *Biomed. Opt. Express* **3** (9), 2012-2020, (2012)
 - 31. Morigaki, K., Kimura, S., Okada, K., Kawasaki, T., Kawasaki, K. "Formation of substrate supported membranes from mixtures of long and short chain phospholipids", *Langmuir* **28** (25), 9649–9655, (2012)
 - 32. Chang, G., Mori, Y., Mori, S., Irie, T., Nagai, H., Goto, T., Tatsu, Y., Imaishi, H., Morigaki, K. "Microarray of human P450 with an integrated oxygen sensing film for high-throughput detection of metabolic activities", *Anal. Chem.* **84** (12), 5292–5297, (2012)
 - 33. Morigaki, K., Mizutani, K., Kanemura, E., Tatsu, Y., Yumoto, N., Imaishi, H. "Photo-regulation of cytochrome P450 activity by using caged compound", *Anal. Chem.* **84**

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34. Nomura, K., Lintuluoto, M., Morigaki, K. "Hydration and temperature dependence of ¹³C and ¹H NMR spectra of the DMPC phospholipid membrane and complete resonance assignment of its crystalline state", *J. Phys. Chem. B* **115** (50), 14991-15001, (2011)
35. Inaba, T., Tatsu, Y., Morigaki, K. "Fusion of lipid vesicles with planar lipid bilayers induced by a combination of peptides", *Langmuir* **27** (20), 12515-12520, (2011)
36. Tawa, K., Cui, X., Kintaka, K., Nishii, J., Morigaki, K. "Sensitive bioimaging in microfluidic channels on the plasmonic substrate: Application of an enhanced fluorescence based on the reverse coupling mode", *J. Photochem. Photobiol., A* **221** (3), 261-267, (2011)
37. Chang, G., Morigaki, K., Tatsu, Y., Hikawa, T., Goto, T., Imaishi, H. "Vertically integrated human P450 and oxygen sensing film for the assays of P450 metabolic activities", *Anal. Chem.* **83** (8), 2956-2963, (2011)
38. Fujiwara, M., Shiokawa, K., Araki, M., Ashitaka, N., Morigaki, K., Kubota, T., Nakahara, Y. "Encapsulation of proteins into CaCO₃ by phase transition from vaterite to calcite", *Cryst. Growth Des.* **10** (9), 4030-4037, (2010)
39. Goto, T., Moriuchi, H., Fu, X., Ikegawa, T., Matsubara, T., Chang, G., Uno, T., Morigaki, K., Isshiki, K., Imaishi, H. "The effects of single nucleotide polymorphisms in CYP2A13 on metabolism of 5-methoxypsolarene", *Drug Metab. Dispos.* **38** (12), 2110-2116, (2010)
40. Chang, G., Tatsu, Y., Goto, T., Imaishi, H., Morigaki, K. "Glucose concentration determination based on silica sol-gel encapsulated glucose oxidase optical biosensor arrays", *Talanta* **83** (1), 61-65, (2010)
41. Nakai, K., Morigaki, K., Iwasaki, Y. "Molecular recognition on fluidic lipid bilayer microarray corralled by well-defined polymer brushes", *Soft Matter* **6** (23), 5937-5943, (2010)
42. Tawa, K., Morigaki, K. "In-situ imaging of micropatterned phospholipid membranes by surface plasmon fluorescence microscopy", *Colloids Surf. B* **81** 447-451, (2010)
43. Okazaki, T., Tatsu, Y., Morigaki, K. "Phase separation of lipid microdomains controlled by polymerized lipid bilayer matrices", *Langmuir* **26** (6), 4126-4129, (2010)
44. Watanabe, K., Miyazaki, R., Terakado, G., Okazaki, T., Morigaki, K., Kano, H. "High resolution imaging of patterned model biological membranes by localized surface plasmon microscopy", *Appl. Opt.* **49** (5), 887-891, (2010)
45. Okazaki, T., Inaba, T., Tatsu, Y., Tero, R., Urisu, T., Morigaki, K. "Polymerized lipid

- bilayers on solid substrate: Morphologies and obstruction of lateral diffusion", *Langmuir* **25** (1), 345-351, (2009)
46. Nomura, K., Inaba, T., Morigaki, K., Brandenburg, K., Seydel, U., Kusumoto, S. "Interaction of lipopolysaccharide and phospholipid in mixed membranes: Solid-state ^{31}P -NMR spectroscopic and microscopic investigations", *Biophys. J.* **95** 1226-1238, (2008)
47. Ishizuka-Katsura, Y., Wazawa, T., Ban, T., Morigaki, K., Aoyama, S. "Biotin-containing phospholipid vesicle layer formed on the self-assembled monolayer of a saccharide-terminated alkyl disulfide for surface plasmon resonance biosensing", *J. Biosci. Bioeng.* **105** (5), 527-535, (2008)
48. Fujiwara, M., Shiokawa, K., Morigaki, K., Tatsu, Y., Nakahara, Y. "Calcium phosphate composite materials including inorganic powders, BSA or duplex DNA prepared by W/O/W interfacial reaction method", *Mater. Sci. Eng., C* **28** 280-288, (2008)
49. Fujiwara, M., Shiokawa, K., Morigaki, K., Zhu, Y., Nakahara, Y. "Calcium carbonate microcapsules encapsulating biomacromolecules", *Chem. Eng. J. (Lausanne)* **137** (1), 14-22, (2008)
50. Yagi, H., Ban, T., Morigaki, K., Naiki, H., Goto, Y. "Visualization and classification of amyloid β supramolecular assemblies ", *Biochemistry* **46** (51), 15009-15017, (2007)
51. Morigaki, K., Schönherr, H., Okazaki, T. "Polymerization of diacetylene phospholipid bilayers on solid substrate: Influence of the film deposition temperature ", *Langmuir* **23** (24), 12254-12260, (2007)
52. Ueda, Y., Morigaki, K., Tatsu, Y., Yumoto, N., Imaishi, H. "Immobilization and activity assay of cytochrome P450 on patterned lipid membranes", *Biochem. Biophys. Res. Commun.* **355** 926-931, (2007)
53. Fujiwara, M., Shiokawa, K., Hayashi, K., Morigaki, K., Nakahara, Y. "Direct encapsulation of BSA and DNA into silica microcapsules (hollow spheres)", *J. Biomed. Mat. Res. A* **81A** 103-112, (2007)
54. Namani, T., Ishikawa, T., Morigaki, K., Walde, P. "Vesicles from docosahexaenoic acid", *Colloids Surf. B* **54** 118-123, (2007)
55. Okazaki, T., Morigaki, K., Taguchi, T. "Phospholipid vesicle fusion on micropatterned polymeric bilayer substrates", *Biophys. J.* **91** 1757-1766, (2006)
56. Morigaki, K., Tawa, K. "Vesicle fusion studied by surface plasmon resonance and surface plasmon fluorescence spectroscopy", *Biophys. J.* **91** 1380-1387, (2006)
57. Ban, T., Morigaki, K., Yagi, H., Kawasaki, T., Kobayashi, A., Yuba, S., Naiki, H.,

- Goto, Y. "Real-time and single fibril observation of the formation of amyloid beta spherulitic structures", *J. Biol. Chem.* **281** (44), 33677-33683, (2006)
58. Ikeda, K., Nakazawa, H., Shimo-Oka, A., Ishio, K., Miyata, S., Hosokawa, Y., Matsumura, S., Masuhara, H., Belloncik, S., Alain, R., Goshima, N., Nomura, N., Morigaki, K., Kawai, A., Kuroita, T., Kawakami, B., Endo, Y., Mori, H. "Immobilization of diverse foreign proteins in viral polyhedra and potential application for protein microarrays", *Proteomics* **6** (1), 54-66, (2006)
59. Tawa, K., Morigaki, K. "Substrate-supported phospholipid membranes studied by surface plasmon resonance and surface plasmon fluorescence spectroscopy", *Biophys. J.* **89** 2750-2758, (2005)
60. Morigaki, K., Kiyosue, K., Taguchi, T. "Micropatterned composite membranes of polymerized and fluid lipid bilayers", *Langmuir* **20** (18), 7729-7735, (2004)
61. Morigaki, K., Walde, P., Misran, M., Robinson, B. H. "Thermodynamic and kinetic stability. Properties of micelle and vesicle systems formed by decanoic acid/ decanoate", *Colloids Surf. A* **213** 37-44, (2003)
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63. Morigaki, K., Walde, P. "Giant vesicles formation from oleic acid/ sodium oleate on glass surfaces induced by adsorbed hydrocarbon molecules", *Langmuir* **18** (26), 10509-10511, (2002)
64. Morigaki, K., Baumgart, T., Jonas, U., Offenhäusser, A., Knoll, W. "Photopolymerization of diacetylene lipid bilayers and its application to the construction of micropatterned biomimetic membranes", *Langmuir* **18** (10), 4082-4089, (2002)
65. Morigaki, K., Baumgart, T., Offenhäusser, A., Knoll, W. "Patterning solid-supported lipid bilayer membranes by lithographic polymerization of a diacetylene lipid", *Angew. Chem., Int. Ed.* **40** 172-174, (2001)
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69. Morigaki, K., Liu, Z. F., Hashimoto, K., Fujishima, A. "Azobenzene-derivative

- Langmuir-Blodgett films deposited on various thiol monolayers", *J. Phys. Chem.* **99** (40), 14771-14777, (1995)
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2. Reviews and book chapters (selected)

1. Morigaki, K. "Substrate-supported model membrane as a versatile analytical/biosensing platform", *Anal. Sci.* **37** 683-689, (2021)
2. Yasuhara, K., Morigaki, K. "New lipid membrane technologies for reconstitution, analysis, and utilization of 'living' membrane proteins", *Biophys. Physicobiol.* **17** 125-129, (2020)
3. Morigaki, K., Tanimoto, Y. "Evolution and development of model membranes for physicochemical and functional studies of the membrane lateral heterogeneity", *Biochim. Biophys. Acta* **1860** (10), 2012-2017, (2018)
4. Morigaki, K. "Micropatterned model biological membranes on a solid surface", in "Handbook of Biofunctional Surfaces", Knoll, W., Singapore, Pan Stanford Publishing, 639-659, (2012)
5. Morigaki, K. "Functional interfaces from substrate-supported lipid membranes", *Journal of Japanese Society for Biomaterials* **27** 145-150, (2009)
6. Morigaki, K. "Micropatterned lipid bilayer membranes on solid substrates", in "Advances in Planar Lipid Bilayers and Liposomes", Leitmannova-Liu, A., Amsterdam, Elsevier, **9**, 107-134, (2009)
7. Morigaki, K. "Micropatterned model biological membranes composed of polymerized and fluid lipid bilayers", *Biointerphases* **3** 85-89, (2008)
8. Morigaki, K. and Walde, P. "Fatty acid vesicles", *Curr. Opin. Colloid Interface Sci.* **12** 75-80, (2007)
9. Walde, P., Namani, T., Morigaki, K. and Hauser, H. "Formation and properties of fatty acid vesicles (liposomes)", in "Liposome Technology", Gregoriadis, G., New

York, Informa Healthcare, **1**, 1-19, (2006)

10. Knoll, W., Morigaki, K., Naumann, R., Sacca, B., Schiller, S. M. and Sinner, E. K. "Functional tethered lipid bilayer membranes", in "Ultrathin Electrochemical Chemo- and Biosensors - Technology and Performance", Mirsky, V. M., Berlin, Springer, **2**, 239-253, (2004)
11. Morigaki, K., Enomoto, T., Hashimoto, K. and Fujishima, A. "Photoelectrochromic and potentiochromic behaviors of azobenzene LB film", *Mol. Cryst. Liq. Cryst.* **246** 409-412, (1994)
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