CURRICULUM VITAE

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Personal Information

Name:	MORIHIRO Kunihiko
Date of Birth:	July 24, 1984
Place of Birth:	Shimane, Japan
Gender:	Male
Nationality:	Japanese
Present Address:	Department of Chemistry and Biotechnology, Graduate School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan
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Education/Career

2008.3	**B.Sc** Department of Pharmaceutical Sciences, Osaka University (Professor Takeshi Imanishi)
2010.3	**M.Sc** Graduate School of Pharmaceutical Sciences, Osaka University (Professor Satoshi Obika)
2013.3	**Ph.D.** Graduate School of Pharmaceutical Sciences, Osaka University (Professor Satoshi Obika)
2013.4-2015.3	**Postdoctral Fellow** National Institute of Biomedical Innovation (NIBIO) (Invited Project Leader Satoshi Obika)
2015.4-2017.2	**JSPS Postdoctral Fellow for Research Abroad** Department of Chemistry, University of Pittsburgh, United States (Professor Alexander Deiters)
2017.3-2024.1	**Research Associate** Department of Chemistry and Biotechnology, Graduate School of Engineering, The University of Tokyo (Professor Akimitsu Okamoto)
2024.2-	**Associate Professor**

Department of Chemistry and Biotechnology, Graduate School of Engineering, The University of Tokyo (Professor Akimitsu Okamoto)

Fellowships and Grant

2023.4-2026.3	AMED Innovative Drug Discovery and Development
2022.4-2023.3	JST ACT-X Acceleration Phase
2021.4-2024.3	JSPS Grant-in-Aid for Scientific Research(C)
2020.4-2022.3	JSPS Grant-in-Aid for Scientific Research on Innovative Areas
2019.10-2022.3	JST ACT-X
2019.4-2021.3	JSPS Grant-in-Aid for Young Scientists
2015.4-2017.2	JSPS Postdoctoral Fellowship for Research Abroad
2013.8-2015.3	JSPS Grant-in-Aid for Research Activity Start-up
2010.4-2013.3	JSPS Research Fellowship for Young Scientists (DC1)

Publication (*Corresponding Author(s))

41) “Amplified Production of a DNA Decoy Catalyzed by Intracellular MicroRNA”
Soshu Yasuda, **Kunihiko Morihiro*** (co-first author), Shuichiro Koga, Akimitsu Okamoto*
Angew. Chem. Int. Ed. **2025**, *64*, e202424421.

40) “Selective Inhibition of Cancer Cell Migration Using a pH-Responsive Nucleobase-Modified DNA Aptamer”
Yuyuan Chen, **Kunihiko Morihiro*** (co-first author), Yui Nemoto, Akito Ichimura, Ryosuke Ueki, Shinsuke Sando, Akimitsu Okamoto*
Chem. Sci. **2024**, *15*, 17097-17102.

39) “Fluorocarbon–DNA Conjugates for Enhanced Cellular Delivery: Formation of a Densely Packed DNA Nano-Assembly”
Minako Narita, Ai Kohata*, Taiichi Kageyama, Honoka Watanabe, Kohsuke Aikawa*, Daisuke Kawaguchi, **Kunihiko Morihiro**, Akimitsu Okamoto, Takashi Okazoe
ChemBioChem **2024**, *25*, e202400436.
Selected as the front cover art

38) “Copper-Mediated siRNA Activation for Conditional Control of Gene Expression”
Kunihiko Morihiro*, Yasuhiro Tomida, Honami Ando, Akimitsu Okamoto*
Bioorg. Med. Chem. Lett. in press.

37) "RNA Oncologic Therapeutics: Intracellular Hairpin RNA Assembly Enables MicroRNA-Triggered Anticancer Functionality"
Kunihiko Morihiro*, Shunto Morita, Naoki Harada, Manami Baba, Jongmin Yum, Mitsuru Naito,

Kanjiro Miyata, Genta Nagae, Akimitsu Okamoto*

J. Am. Chem. Soc. **2024**, *146*, 1346-1355.

36) "Cellular Penetration and Intracellular Dynamics of Perfluorocarbon-Conjugated DNA/RNA as a Potential Means of Conditional Nucleic Acid Delivery"

Masako Takatsu, **Kunihiko Morhiro** (co-first author), Honoka Watanabe, Mizue Yuki, Takara Hattori, Kentaro Noi, Kohsuke Aikawa,* Keiichi Noguchi, Masafumi Yohda, Takashi Okazoe, Akimitsu Okamoto*

ACS Chem. Biol. **2023**, *18*, 2590-2598.

35) "Nucleic Acid-to-Small Molecule Converter through Amplified Hairpin DNA Circuits"

Kunihiko Morihiro*, Yasuhiro Tomida, Daisuke Fukui, Manami Hasegawa, Akimitsu Okamoto*

Angew. Chem. Int. Ed. **2023**, *62*, e202306587.

34) "Interstrand Crosslinking Oligonucleotides Elucidate the Influence of Metal Ions on Methylation Status in Repetitive DNA Elements"

Liu Shan, **Kunihiko Morihiro** (co-first author), Fumika Takeuchi, Yufeng Li, Akimitsu Okamoto*

Front. Chem. **2023**, *11*, 1122474. (Invited article)

33) "Oncolytic Hairpin DNA Pair: Selective Cytotoxic Inducer through MicroRNA-Triggered DNA Self-Assembly"

Kunihiko Morihiro*, Hiraki Osumi, Shunto Morita, Takara Hattori, Manami Baba, Naoki Harada, Riuko Ohashi, Akimitsu Okamoto*

J. Am. Chem. Soc. **2023**, *145*, 135-142.

Selected as the supplementary cover art

Recommended in Faculty Opinions

32) "Identification of Nucleobase Chemical Modifications that Reduce the Hepatotoxicity of Gapmer Antisense Oligonucleotides"

Tokuyuki Yoshida, **Kunihiko Morihiro** (co-first author), Yuki Naito, Atsushi Mikami, Yuuya Kasahara, Takao Inoue*, Satoshi Obika*

Nucleic Acids Res. **2022**, *50*, 7224-7234.

31) "*anti-syn* Unnatural Base Pair Enables Alphabet-Expanded DNA Self-Assembly"

Kunihiko Morihiro, Yuya Moriyama, Yui Nemoto, Hiraki Osumi, Akimitsu Okamoto*

J. Am. Chem. Soc. **2021**, *143*, 14207-14217.

30) "Floxuridine Oligomers Activated under Hypoxic Environment"

Kunihiko Morihiro, Takuro Ishinabe, Masako Takatsu, Hiraki Osumi, Tsuyoshi Osawa, Akimitsu Okamoto*

J. Am. Chem. Soc. **2021**, *143*, 3340-3347.

29) "Azobenzene-Modified DNA Aptamers Evolved by Capillary Electrophoresis (CE)-SELEX

Method”

Kunihiko Morihiro*, Osamu Hasegawa, Yuuya Kasahara, Shohei Mori, Toshiro Kasai, Masayasu Kuwahara, Satoshi Obika*

Bioorg. Med. Chem. Lett. **2021**, *31*, 127607.

28) “Synthesis and Evaluation of Artificial Nucleic Acid Bearing an Oxanorbornane Scaffold”

Hibiki Komine, Shohei Mori, **Kunihiko Morihiro***, Kenta Ishida, Takumi Okuda, Yuuya Kasahara, Hiroshi Aoyama, Takao Yamaguchi*, Satoshi Obika*

Molecules **2020**, *25*, 1732. (Invited article)

27) “Live Cell Sensing of Telomerase Activity by Hybridization-Sensitive Fluorescent Oligonucleotide Probes”

Jiazhuo Chen, **Kunihiko Morihiro** (co-first author), Daisuke Fukui, Lihao Guo, Akimitsu Okamoto*

ChemBioChem **2020**, *21*, 1022-1027.

26) “A Highly Constrained Nucleic Acid Analog Based on α-L-Threosamine”

Kunihiko Morihiro, Akimitsu Okamoto*

Nucleosides Nucleotides Nucleic Acids **2020**, *39*, 270-279. (Invited article)

25) “Phosphine-Activated Lysine Analogues for Fast Chemical Control of Protein Subcellular Localization and SUMOylation”

Joshua S. Wesalo, Ji Luo, **Kunihiko Morihiro**, Jihe Liu, Alexander Deiters*

ChemBioChem **2020**, *21*, 141-148.

Selected as a Very Important Paper

Selected as a Cover Feature

24) “A Hydrogen Peroxide-Activatable Gemcitabine Prodrug for the Selective Treatment of Pancreatic Ductal Adenocarcinoma”

Katsunori Matsushita, Takumi Okuda, Shohei Mori, Masamitsu Konno, Hidetoshi Eguchi, Ayumu Asai, Jun Koseki, Yoshifumi Iwagami, Daisaku Yamada, Hirofumi Akita, Tadafumi Asaoka, Takehiro Noda, Koichi Kawamoto, Kunihito Gotoh, Shogo Kobayashi, Yuuya Kasahara, **Kunihiko Morihiro**, Taroh Satoh, Yuichiro Doki, Masaki Mori, Hideshi Ishii*, Satoshi Obika*

ChemMedChem **2019**, *14*, 1384-1391.

Selected as the outside front cover art

23) “Aryl Azides as Phosphine-Activated Switches for Small Molecule Function”

Bradley Lukasak, **Kunihiko Morihiro**, Alexander Deiters*

Sci. Rep. **2019**, *9*, 1470.

22) “Hydrogen Peroxide-Triggered Gene Silencing in Mammalian Cells through Boronated Antisense Oligonucleotides”

Shohei Mori, **Kunihiko Morihiro***, Takumi Okuda, Yuuya Kasahara, Satoshi Obika*

Chem. Sci. **2018**, *9*, 1112-1118.

Selected as the outside front cover art

21) "Small Molecule Release and Activation through DNA Computing"

Kunihiko Morihiro, Nicholas Ankenbruck, Bradley Lukasak, Alexander Deiters*

J. Am. Chem. Soc. **2017**, *139*, 13909-13915.

20) "Synthesis and Properties of 7-Deazapurine and 8-Aza-7-Deazapurine Locked Nucleic Acid Analogs: The Effect of Glycosidic Torsion Angle"

Takashi Hara, Tetsuya Kodama,* Yumi Takegaki, **Kunihiko Morihiro**, Kosuke Ramon Ito, Satoshi Obika*

J. Org. Chem. **2017**, *82*, 25-36.

Selected as a Featured Article

19) "Biological Applications of Xeno Nucleic Acids"

Kunihiko Morihiro, Yuuya Kasahara, Satoshi Obika*

Mol. BioSyst. **2017**, *13*, 235-245. (Invited Review)

Selected as the outside front cover art

18) "Systematic Evaluation of Biophysical and Functional Characteristics of Selenomethylene Locked Nucleic Acid Mediated Inhibition of miR-21"

Smita Nahar, Amrita Singh, **Kunihiko Morihiro**, Yoshihiro Moai, Tetsuya Kodama, Satoshi Obika, Souvik Maiti*

Biochemistry **2016**, *55*, 7023-7032.

17) "Small Molecule Control of Protein Function through Staudinger Reduction"

Ji Luo, Qingyang Liu, **Kunihiko Morihiro**, Alexander Deiters*

Nat. Chem. **2016**, *8*, 1027-1034.

16) "Synthesis and Properties of 4-(Diarylmethylene)imidazolinone-Conjugated Fluorescent Nucleic Acids"

Takumi Okuda, Shohei Mori, Yuuya Kasahara, **Kunihiko Morihiro**, Masahiro Ikejiri, Kazuyuki Miyashita, Satoshi Obika*

Tetrahedron Lett. **2016**, *14*, 3129-3132.

15) "Wavelength-Selective Light-Triggered Strand Exchange Reaction"

Kunihiko Morihiro, Tetsuya Kodama, Shohei Mori, Shin-ichi Tsunoda, Satoshi Obika*

Org. Biomol. Chem. **2016**, *14*, 1555-1558.

14) "Consecutive Incorporation of Functionalized Nucleotides with Amphiphilic Side Chains by Novel KOD Polymerase Mutant"

Hidekazu Hoshino, Yuuya Kasahara, Hiroto Fujita, Masayasu Kuwahara,* **Kunihiko Morihiro**,

Shin-ichi Tsunoda, Satoshi Obika*

Bioorg. Med. Chem. Lett. **2016**, *26*, 530-533.

13) "Polymerase Incorporation of a 2'-Deoxynucleoside-5'-Triphosphate Bearing a 4-Hydroxy-2-Mercaptobenzimidazole Nucleobase Analogue"

Kunihiko Morihiro,* Hidekazu Hoshino, Osamu Hasegawa, Yuuya Kasahara, Kohsuke Nakajima, Masayasu Kuwahara, Shin-ichi Tsunoda, Satoshi Obika*

Bioorg. Med. Chem. Lett. **2015**, *25*, 2888-2891.

12) "C5-Azobenzene-Functionalized Locked Nucleic Acid Uridine: Isomerization Property, Hybridization Ability, and Enzymatic Stability"

Kunihiko Morihiro,* Osamu Hasegawa, Shohei Mori, Shin-ichi Tsunoda, Satoshi Obika*

Org. Biomol. Chem. **2015**, *13*, 5209-5214.

11) "Synthesis and Properties of 2'-Deoxyuridine Analogues Bearing Various Azobenzene Derivatives at the C5 Position"

Shohei Mori, **Kunihiko Morihiro**,* Yuuya Kasahara, Shin-ichi Tsunoda, Satoshi Obika*

Chemosensors **2015**, *3*, 36-54. (Invited Paper)

10) "C5-Azobenzene-substituted 2'-Deoxyuridine-Containing Oligodeoxynucleotides for Photo-Switching Hybridization"

Shohei Mori, **Kunihiko Morihiro**,* Satoshi Obika*

Molecules **2014**, *19*, 5109-5118. (Invited Paper)

9) "Synthesis and Characterization of Benzylidene Acetal Type Bridged Nucleic Acids (BA-BNAs)"

Tetsuya Kodama, **Kunihiko Morihiro**, Satoshi Obika*

Curr. Protoc. Nucleic Acid Chem. **2014**, 1.31.1-1.31.22. (Invited Protocol)

8) "Development of External Stimuli-Responsive Nucleic Acids by Sugar-, Backbone- and Nucleobase-Modification"

Kunihiko Morihiro, Tetsuya Kodama, Satoshi Obika*

Synlett **2014**, *25*, 1499-1510. (Invited Account)

7) "Photoinduced Changes in Hydrogen Bonding Patterns of 8-Thiopurine Nucleobase Analogues in a DNA Strand"

Kunihiko Morihiro, Tetsuya Kodama, Shohei Mori, Satoshi Obika*

Org. Biomol. Chem. **2014**, *12*, 2468-2473.

6) "Light-Triggered Strand Exchange Reaction Using the Change in the Hydrogen Bonding Pattern of a Nucleobase Analogue"

Kunihiko Morihiro, Tetsuya Kodama, Reiko Waki, Satoshi Obika*

Chem. Sci. **2014**, *5*, 744-750.

5) "Selenomethylene Locked Nucleic Acid Enables Reversible Hybridization in Response to Redox

Changes”

Kunihiko Morihiro, Tetsuya Kodama, Kentefu, Yoshihiro Moai, Rakesh N. Veedu, Satoshi Obika*

Angew. Chem. Int. Ed. **2013**, *52*, 5074-5078.

4) “Synthesis of Selenomethylene-Locked Nucleic Acid (SeLNA)-Modified Oligonucleotides by Polymerases”

Megan Wheeler, Antoine Chardon, Astrid Goubet, **Kunihiko Morihiro**, Sze Yee Tsan, Stacey L. Edwards, Tetsuya Kodama, Satoshi Obika, Rakesh N. Veedu*

Chem. Commun. **2012**, *48*, 11020-11022.

3) “Benzylidene Acetal Type Bridged Nucleic Acids: Changes in Properties upon Cleavage of the Bridge Triggered by External Stimuli”

Kunihiko Morihiro, Tetsuya Kodama, Satoshi Obika*

Chem. Eur. J. **2011**, *17*, 7918-7926.

2) “Effect of 3’-End Capping of Aptamer with Various 2’,4’-Bridged Nucleotides: Enzymatic Post-modification toward a Practical Use of Polyclonal Aptamers”

Yuuya Kasahara, Shunsuke Kitadume, **Kunihiko Morihiro**, Masayasu Kuwahara,* Hiroaki Ozaki, Hiroaki Sawai, Takeshi Imanishi, Satoshi Obika

Bioorg. Med. Chem. Lett. **2010**, *20*, 1626-1629.

1) “Synthesis of Light-Responsive Bridged Nucleic Acid and Change in Affinity with Complementary ssRNA”

Kunihiko Morihiro, Tetsuya Kodama, Masaru Nishida, Takeshi Imanishi, Satoshi Obika*

ChemBioChem **2009**, *10*, 1784-1788.