

**Metallo-DNA wire**

----- 2020 年 -----

Tatsuya Funai, Chizuko Tagawa, Osamu Nakagawa, Shun-ichi Wada, Akira Ono and Hidehito Urata

Enzymatic formation of consecutive thymine-Hg<sup>II</sup>-thymine base pairs by DNA polymerases

*Chem. Commun.*, **2020**, 56, 12025-12028

DOI: 10.1039/d0cc04423g

<https://doi.org/10.1039/D0CC04423G>

Ryo Yamada, Issei Nomura, Yuki Yamaguchi, Yosuke Matsuda, Yoshikazu Hattori, Hirokazu Tada, Akira Ono, Yoshiyuki Tanaka

Electrical conductance measurement of Hg<sup>II</sup>-mediated DNA duplex in buffered aqueous solution

*Nucleosides, Nucleotides, & Nucleic Acids*, **2020**, 39 (8), 1083-1087.

<https://doi.org/10.1080/15257770.2020.1755044>

(2020 Apr 28.)

Tatsuya Funai, Megumi Aotani, Risa Kiri, Junko Nakamura, Yuki Miyazaki, Dr. Osamu Nakagawa, Dr. Shun-ichi Wada, Prof. Dr. Hidetaka Torigoe, Prof. Dr. Akira Ono and Prof. Dr. Hidehito Urata

“Silver(I) ion-mediated cytosine-containing base pairs: Metal ion specificity for duplex stabilization and susceptibility toward DNA polymerases”

*ChemBioChem*, 2020, 21 (4), 517-522

<https://doi.org/10.1002/cbic.201900450> (First published: 28 August 2019)

-----2019年-----

Very Important Paper に選ばれました。

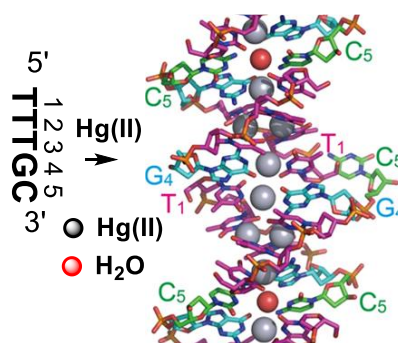
Akira Ono, Hiroki Kanazawa, Hikari Ito, Misato Goto,  
Koudai Nakamura, Hisao Saneyoshi, Jiro Kondo

“Novel DNA helical wire containing Hg(II) mediated T:T  
and T:G pairs” (Very Important Paper)

*Angew. Chem. Int. Ed.*, **2019**, 58, 16835-16838.

*Angew. Chem.* **2019**, 131, 16991–16994.

<https://doi.org/10.1002/anie.201910029>

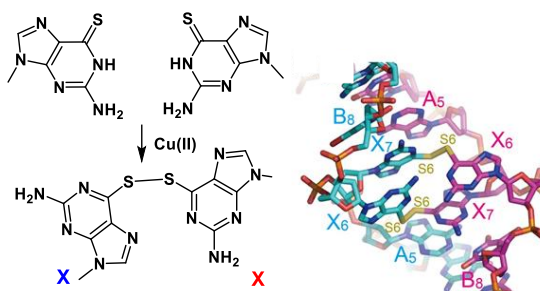


Akira Ono, Takahiro Atsugi, Misato Goto, Hisao Saneyoshi, Takahito Tomori, Kohji Seio,  
Takenori Dairaku and Jiro Kondo

“Crystal structure of a DNA duplex cross-  
linked by 6-thioguanine–6-thioguanine  
disulfides: reversible formation and  
cleavage catalyzed by Cu(II) ions and  
glutathione”

*RSC Adv.*, **2019**, 9, 22859–22862

<https://doi.org/10.1039/C9RA03515J>



Xiwen Xing, Yihong Feng, Zutao Yu, Kumi Hidaka, Fenyong Liu, Akira Ono, Hiroshi  
Sugiyama,\* and Masayuki Endo

“Direct Observation of the Double-Stranded DNA Formation through Metal Ion-Mediated  
Base Pairing in the Nanoscale Structure”

*Chem. Eur. J.*, **2019**, 25, 1446-1450.

<https://doi.org/10.1002/chem.201805394>

-----2017年-----

Akira Ono, Toru Sugawara, Hisao Saneyoshi, Jiro Kondo,

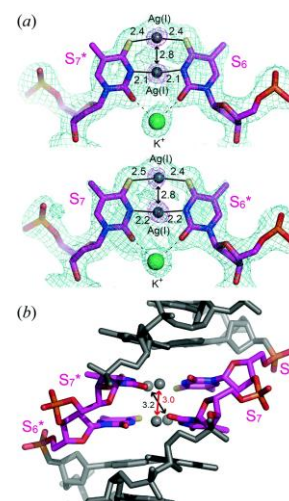
“Crystal structure of a DNA duplex containing four Ag(I) ions in  
consecutive dinuclear Ag(I)-mediated base pairs:

4-thiothymine–2Ag(I)–4-thiothymine”

*Chem. Comm.*, **2017**, 53, 11747 - 11750. (Cover)

DOI:10.1039/C7CC06153F

<https://doi.org/10.1039/C7CC06153F>

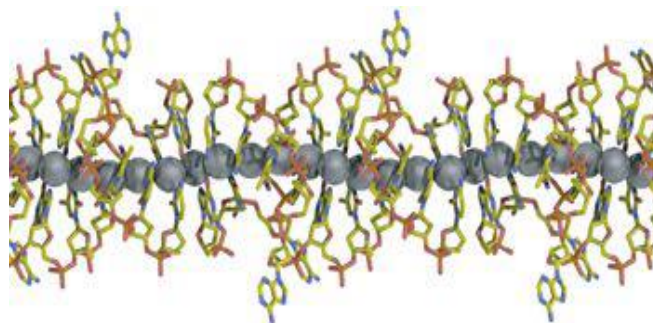


Jiro Kondo\*, Yoshinari Tada, Takenori Dairaku, Yoshikazu Hattori, Hisao Saneyoshi, Akira Ono, Yoshiyuki Tanaka

"A metallo-DNA nanowire with uninterrupted one-dimensional silver array"

*Nature Chemistry*, **2017**, 9(10), 956-960. doi:10.1038/nchem.2808.

<https://www.nature.com/articles/nchem.2808>



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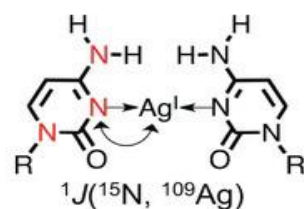
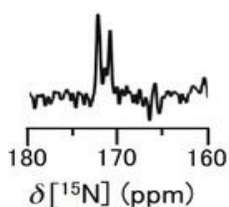
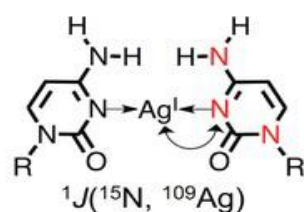
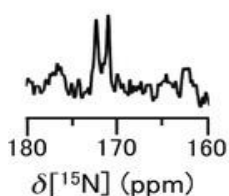
Takenori Dairaku,\* Kyoko Furuita, Hajime Sato, Jakub Šebera, Katsuyuki Nakashima, Jiro Kondo, Daichi Yamanaka, Yoshinori Kondo, Itaru Okamoto, Akira Ono, Vladimír Sychrovský,\* Chojiro Kojima,\* and Yoshiyuki Tanaka\*

"Structure Determination of an Ag<sup>I</sup>-Mediated Cytosine–Cytosine Base Pair within DNA Duplex in Solution with <sup>1</sup>H/<sup>15</sup>N/<sup>109</sup>Ag NMR Spectroscopy"

*Chem. Eur. J.* **2016**, 22, 13028-13031.

DOI: 10.1002/chem.201603048

<https://doi.org/10.1002/chem.201603048>



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“Hg<sup>II</sup>/Ag<sup>I</sup>-mediated base pairs and their NMR spectroscopic studies”

*Inorg. Chim. Acta*, **2016**, *452*, 34-42.

(DOI: 10.1016/j.ica.2016.03.018)

<https://doi.org/10.1016/j.ica.2016.03.018>

Jakub Šebera, Yoshiyuki Tanaka, Akira Ono, Vladimír Sychrovský

“The effect of chemical modification of DNA base on binding of Hg-II and Ag-I in metal-mediated base pairs”

*Inorganic Chimica Acta*, **2016**, *452*, 199-204.

<https://doi.org/10.1016/j.ica.2016.03.007>

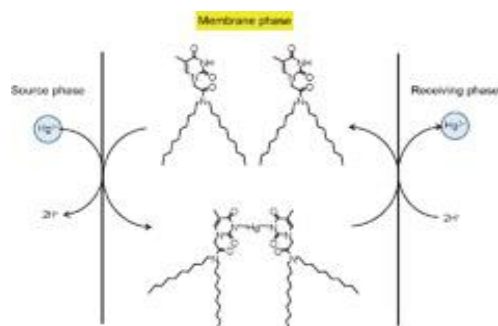
----- 2015 年 -----

Tatsuo Kurokawa,\* Manabu Igawa, Akira Ono, and Itaru Okamoto\*

“Selective Transport of Mercury(II) Ions across Supported Liquid Membrane with Thymine Derivative as Carrier”

*Chem. Lett.*, **2015**, *44*, 1732–1734.

doi:10.1246/cl.150769 <https://doi.org/10.1246/cl.150769>



Takenori Dairaku, Kyoko Furuita, Hajime Sato, Yoshinori Kondo, Chojiro Kojima, Akira Ono & Yoshiyuki Tanaka\*

“Exploring a DNA Sequence for the Three-Dimensional Structure Determination of a Silver(I)-Mediated C-C Base Pair in a DNA Duplex By 1H NMR Spectroscopy”

*Nucleosides Nucleotides Nucleic Acids*. **2015**, *34* (12), 877-900.

DOI:10.1080/15257770.2015.1088160

<https://doi.org/10.1080/15257770.2015.1088160>

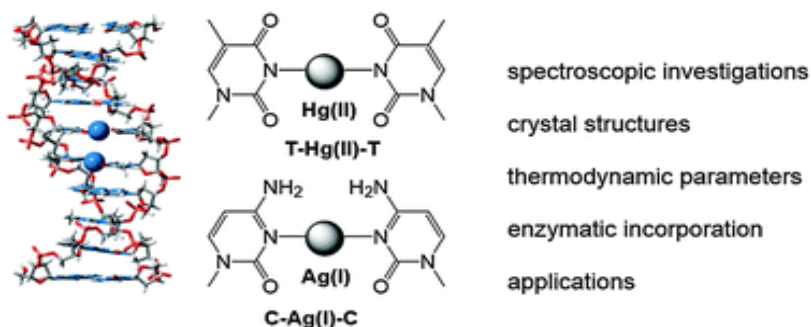
Yoshiyuki Tanaka,\* Jiro Kondo, Vladimír Sychrovský, Jakub Šebera, Takenori Dairaku, Hisao Saneyoshi, Hidehito Urata, Hidetaka Torigoe and Akira Ono\*

“Structures, physicochemical properties, and applications of T–Hg<sup>II</sup>–T, C–Ag<sup>I</sup>–C, and other metallo-base-pairs”

*Chem. Comm.*, **2015**, 51(98), 17343-17360. “Feature Article”

DOI: 10.1039/C5CC02693H

<https://doi.org/10.1039/C5CC02693H>



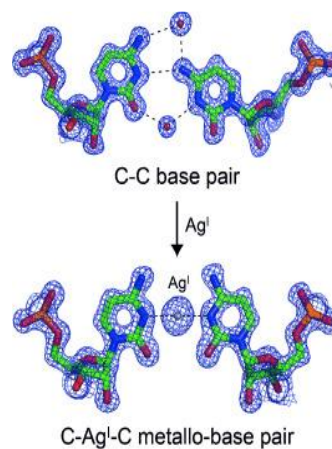
Jiro Kondo\*, Yoshinari Tada, Takenori Dairaku, Hisao Saneyoshi, Itaru Okamoto, Yoshiyuki Tanaka,  
Akira Ono

“High-resolution crystal structure of Ag<sup>I</sup>-RNA hybrid duplex containing Watson-Crick-like C–Ag<sup>I</sup>–C metallo-base pairs”

*Angew. Chem. Int. Ed.*, **2015**, 54, Issue 45, 13323–13326.

(10.1002/anie.201507894)

<https://doi.org/10.1002/ange.201507894>



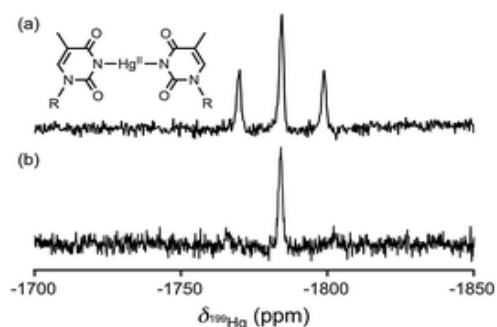
Takenori Dairaku, Kyoko Furuita, Hajime Sato, Jakub Šebera, Daichi Yamanaka, Hiroyuki Otaki, Shoko Kikkawa, Yoshinori Kondo, Ritsuko Katahira, F. Matthias Bickelhaupt, Céilia Fonseca Guerra, Akira Ono, Vladimír Sychrovský, Chojiro Kojima, and Yoshiyuki Tanaka

“Direct detection of the mercury–nitrogen bond in the thymine–Hg<sup>II</sup>–thymine base-pair with <sup>199</sup>Hg NMR spectroscopy”

*Chem. Comm.*, **2015**, 51, 8488-8491.

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Mitsuhiro Kuriyama, Kaichiro Haruta, Takenori Dairaku, Takuya Kawamura, Shoko Kikkawa, Kiyofumi Inamoto, Hirokazu Tsukamoto, Yoshinori Kondo, Hidetaka Torigoe, Itaru Okamoto, Akira Ono, Eugene Hayato Morita, Yoshiyuki Tanaka

“Hg<sup>2+</sup>-Trapping Beads: Hg<sup>2+</sup>-Specific Recognition through Thymine–Hg(II)–Thymine Base Pairing”

*Chem. Pharm. Bull.*, **2014**, 62, 709–712.

<https://doi.org/10.1248/cpb.c13-00918>

Tatsuya Funai, Junko Nakamura, Yuki Miyazaki, Risa Kiri, Osamu Nakagawa, Shunichi Wada, Akira Ono, and Hidehito Urata\*

“Regulated Incorporation of Two Different Metal Ions into Programmed Sites in a Duplex by DNA Polymerase Catalyzed Primer Extension” *Angew. Chem. Int. Ed.*, **2014**, 53, 6624–6627.

DOI: 10.1002/anie.201311235

<https://doi.org/10.1002/anie.201311235>

J. Kondo, T. Yamada, C. Hirose, I. Okamoto, Y. Tanaka, A. Ono,

“Crystal structure of metallo-DNA duplex containing consecutive Watson-Crick-like T-Hg(II)-T base pairs”

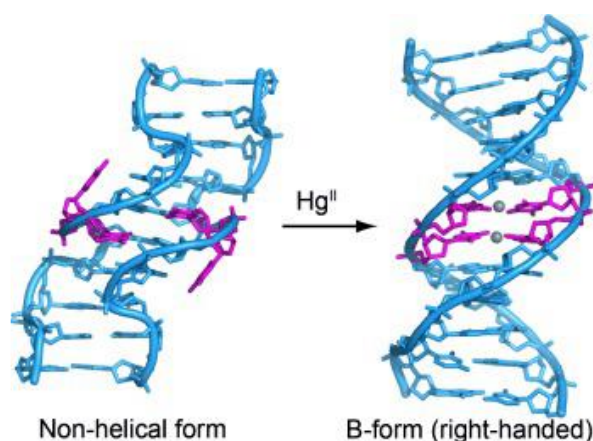
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<https://doi.org/10.1002/anie.201309066>

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H. Yamaguchi, J. Šebera, J. Kondo, S. Oda, T. Komuro, T. Kawamura, T. Dairaku, Y. Kondo, I. Okamoto, A. Ono, J. V. Burda, C. Kojima, V. Sychrovský and Y. Tanaka,

“The structure of metallo-DNA with consecutive thymine–Hg<sup>II</sup>–thymine base pairs explains positive entropy for the metallo base pair formation”

*Nucleic Acids Research*, **2014**, 42, 4094–4099.

doi:10.1093/nar/gkt1344 <https://doi.org/10.1093/nar/gkt1344>

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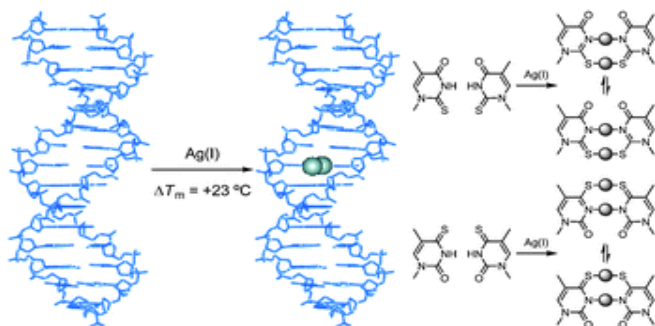
Jakub Šebera, Jaroslav Burda, Michal Straka, Akira Ono, Chojiro Kojima, Yoshiyuki Tanaka, and Vladimír Sychrovský\*

“Formation of a Thymine-HgII-Thymine Metal-Mediated DNA Base Pair: Proposal and Theoretical Calculation of the Reaction Pathway” *Chem. Eur. J.*, **2013**, *19*, 9884 – 9894. 10.1002/chem.201300460

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Itaru Okamoto\*, Takashi Ono, Rimi Sameshima and Akira Ono\*

“Metal ion-binding properties of DNA duplexes containing thiopyrimidine base pairs” *Chem. Commun.*, (2012) **48**, 4347-4349. <https://doi.org/10.1039/C2CC15436F>



Tomomi Uchiyama#, Takashi Miura#, Hideo Takeuchi, Takenori Dairaku, Tomoyuki Komuro, Takuya Kawamura, Yoshinori Kondo, Ladislav Benda, Vladimír Sychrovský\*, Petr Bour, Itaru Okamoto\*, Akira Ono and Yoshiyuki Tanaka\*,

“Raman spectroscopic detection of the T-Hg<sup>II</sup>-T base pair and the ionic characteristics of mercury”

*Nucleic Acids Research*, (2012), **40**, 5766-5774. <https://doi.org/10.1093/nar/gks208>

Tatsuya Funai, Yuki Miyazaki, Megumi Aotani, Eriko Yamaguchi, Osamu Nakagawa, Shunichi Wada, Hidetaka Torigoe, Akira Ono, and Hidehito Urata\*

“Ag<sup>I</sup> Ion Mediated Formation of a C–A Mismatch by DNA Polymerases”

*Angew. Chem. Int. Ed.*, (2012), **51**, 6464 –6466. <https://doi.org/10.1002/anie.201109191>

Hidetaka Torigoe,\* Itaru Okamoto, Takenori Dairaku, Yoshiyuki Tanaka, Akira Ono, T. Kozasa,

“Thermodynamic and structural properties of the specific binding between Ag<sup>+</sup> ion and C:C mismatched base pair in duplex DNA to form C-Ag-C metal-mediated base pair”

*Biochimie*, (2012) , *94*, 2431-2440. <https://doi.org/10.1016/j.biochi.2012.06.024>

Hidetaka Torigoe, Yukako Miyakawa, Akira Ono, Tetsuo Kozasa

“Positive cooperativity of the specific binding between Hg<sup>2+</sup> ion and T:T mismatched base pairs in duplex DNA”

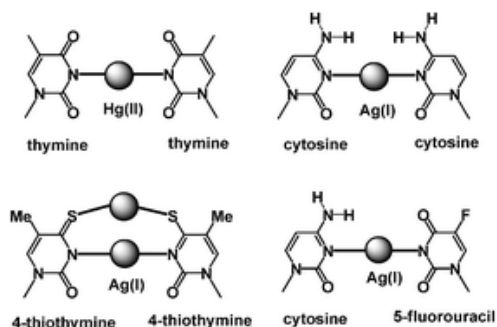
*Thermochimica Acta* (2012) 532, 28– 35. <https://doi.org/10.1016/j.tca.2011.03.018>

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"Binding of metal ions by pyrimidine base pairs in DNA duplexes" *Chem. Soc. Rev.*, (2011) 40, 5855-5866.

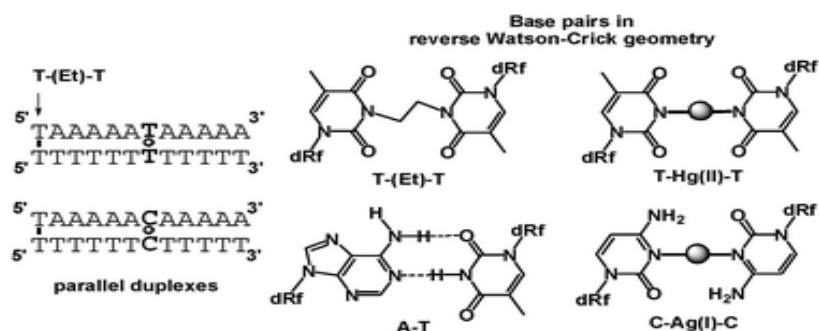
<https://doi.org/10.1039/C1CS15149E>



T. Ono, K. Yoshida, Y. Saotome, R. Sakabe, I. Okamoto, A. Ono\*

"Synthesis of covalently linked parallel and antiparallel DNA duplexes containing the metal-mediated base pairs T-Hg(II)-T and C-Ag(I)-C" *Chem. Comm.*, (2011), 47 (5), 1542-1544.

<https://doi.org/10.1039/C0CC02028A>



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"Thermodynamic Properties of the Specific Binding between Ag<sup>+</sup> Ions and C:C Mismatched Base Pairs in Duplex DNA"

*Nucleosides, Nucleotides, & Nucleic Acids*, **30**(2), 149-167 (2011). doi: 10.1080/15257770.2011.553210

Torigoe, H., Ono, A., and Kozasa, T.

"Detection of Single Nucleotide Polymorphisms by the Specific Interaction between Transition Metal Ions and Mismatched Base Pairs in Duplex DNA"

*Transition Metal Chemistry*, **36**(2), 121-144 (2011). DOI: 10.1007/s11243-010-9445-z



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Hidetaka Torigoe, Akira Ono, and Tetsuo Kozasa

“Hg(II) Ion Specifically Binds with T:T Mismatched Base Pair in Duplex DNA”

*Chem. Eur. J.*, **2010**, *16*, 13218-13225. <https://doi.org/10.1002/chem.201001171>

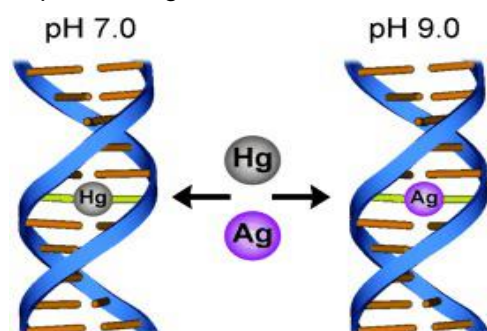
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Itaru Okamoto, Kenji Iwamoto, Yuko Watanabe, Yoko Miyake, Akira Ono

“Switching Metal Ion Binding Selectivity of Chemically Modified Uracil Pairs in DNA Duplexes Triggered by pH Change”

*Angew. Chem. Int. Ed.*, **2009**, *48*, 1648-1651.

<https://doi.org/10.1002/anie.200804952>



Yoshiyuki Tanaka\* and Akira Ono\*, Structural Studies on Mercury<sup>II</sup>-mediated T-T Base-pair with NMR Spectroscopy (Chapter 16), In Nick Hadjiladis and Einar Sletten Eds.,

**"Metal Complexes - DNA Interactions"**,

John Wiley & Sons, West Sussex, UK (2009). ISBN: 978-1-4051-7629-3 (英文著書)

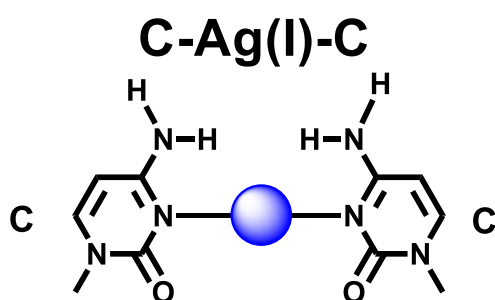
----- 2008 年度 -----

Akira Ono\*, Shiqi Cao, Humika Togashi, Mitsuru Tashiro, Takashi Fujimoto, Tomoya Machinami, Shuji Oda, Yoko Miyake, Itaru Okamoto, and Yoshiyuki Tanaka

“Specific interactions between Silver(I) Ions and Cytosine–Cytosine Pairs in DNA Duplexes”

*Chem. Comm.*, (2008), 4825-4827. (22 Aug 2008)

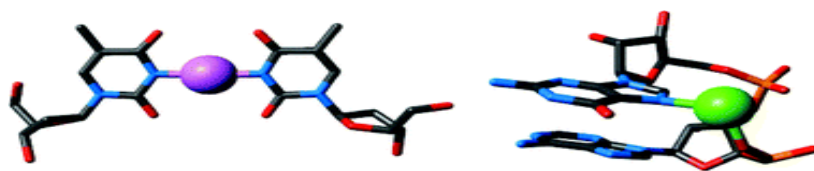
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Yoshiyuki Tanaka\* and Akira Ono\*

“Nitrogen-15 NMR spectroscopy of N-metallated nucleic acids: insights into  $^{15}\text{N}$  NMR parameters and N–metal bonds”

*Dalton Trans.*, (2008), issue 37, 4965–4974. <https://doi.org/10.1039/B803510P>



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「新規ナノデバイス材料としてのメタロ DNA 分子の構造」

生物物理、48 (2)、119-124 (2008)

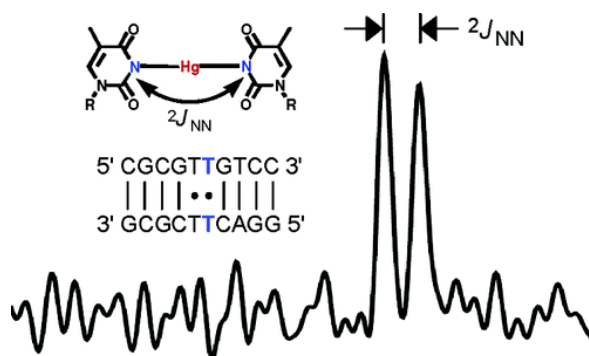
<https://doi.org/10.2142/biophys.48.119>

----- 2007 年度 -----

Yoshiyuki Tanaka\*, Shuji Oda, Hiroshi Yamaguchi, Yoshinori Kondo, Chojiro Kojima and Akira Ono\*

“ $^{15}\text{N}$ - $^{15}\text{N}$   $J$ -coupling across  $\text{Hg}^{\text{II}}$ : Direct observation of  $\text{Hg}^{\text{II}}$ -mediated T-T base pairs in a DNA duplex”, *J. Am. Chem. Soc.*, **2007**, 129, 244-245.

<https://doi.org/10.1021/ja065552h>



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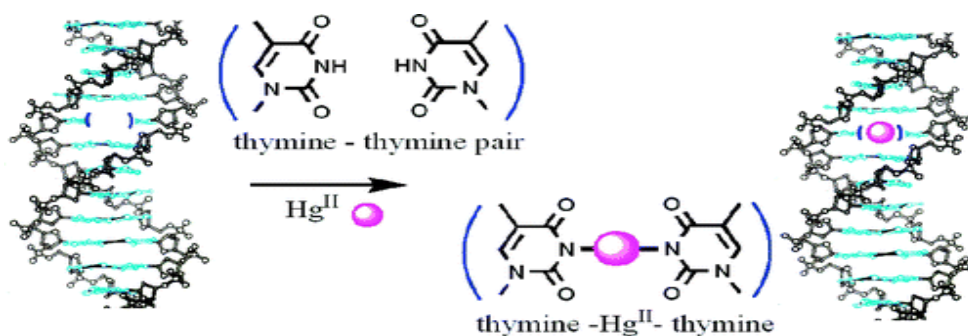
Yoko Miyake, Humika Togashi, Mitsuru Tashiro, Hiroshi Yamaguchi, Shuji Oda, Megumi Kudo, Yoshiyuki Tanaka, Yoshinori Kondo, Ryuichi Sawa, Takashi Fujimoto, Tomoya Machinami, Akira Ono

“Mercury<sup>II</sup>-mediated formation of thymine- $\text{Hg}^{\text{II}}$ -thymine base pairs in DNA duplexes”

*J. Am. Chem. Soc.*, **2006**, 128, 2172-2173.

DOI: 10.1021/ja056354d

<https://doi.org/10.1021/ja056354d>



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“NMR spectroscopic study of a DNA duplex with mercury-mediated T-T base pairs”  
*Nucleoside Nucleotides & Nucleic Acids*, 25, 613-624 (2006).

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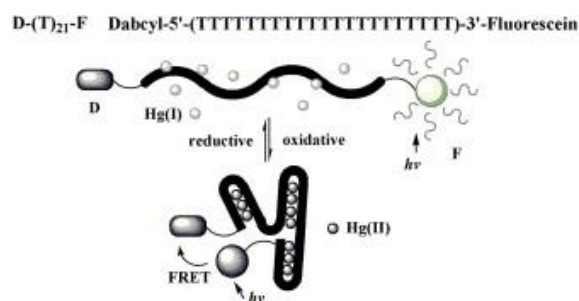
Torigoe, H. and Ono, A.

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“Fluorescent Sensor for Redox-Environment: A Redox-Controlled Molecular Device Based on the Reversible Mercury Mediated Folded Structure Formation of Oligothymidylate”  
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*化学と工業*, 58-4, 469-472, (2005) (10015599659)

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