

研究期間全年度 研究業績

伊與田正彦 (首都大学東京理工学研究科・大学教育センター、A03 班 公募班員)

1 . 発表論文等 (査読付き論文, 著書, 総説等の発表状況)

- (1) Additive Electron Pathway and Nonadditive Molecular Conductance by Using a Multipodal Bridging Compound
Kiguchi, M.*; Takahashi, Y.; Fujii, S.; Takase, M.; Narita, T.; Iyoda, M.*; Horikawa, M.; Naitoh, Y.; Nakamura, H.* *J. Chem. Phys. C* **2014**, *118*, 5275-5283. (10.1021/jp4100262)
- (2) Multifunctional p-Expanded Macrocyclic Oligothiophene 6-Mers and Related Macrocyclic Oligomers
Iyoda, M.*; Tanaka, K.; Shimizu, H.; Hasegawa, M.; Nishinaga, T.; Nishiuchi, T.; Kinugi, Y.; Ishida, T.; Otani, H.; Sato, H.; Inukai, K.; Tahara, K.; Tobe, Y. *J. Am. Chem. Soc.* **2014**, *136*, 2389-2396. (10.1021/ja4101744)
- (3) Effect of Substituents on the Structure, Stability, and p-Dimerization of Dithienylpyrrole Radical Cations
Nishinaga, T.*; Kageyama, T.; Koizumi, M.; Ando, K.; Takase, M.; Iyoda, M. *J. Org. Chem.* **2013**, *78*, 9205-9213. (10.1021/jo401453s)
- (4) Synthesis of Pentadecaphenylenes, Its Inclusion Properties, and Nanostructure Formation with C₆₀
Rahman, M. J.; Shimizu, H.; Araki, Y.; Ikeda, H.; Iyoda, M.* *Chem. Commun.* **2013**, *49*, 9251-9253. (10.1039/c3cc42922a)
- (5) Structure-dependent Electronic Natures of Star-shaped Oligothiophenes Probed by Ensemble and Single-molecule Spectroscopy
Chung, H.; Narita, T.; Yang, J.; Kim, P.; Takase, M.; Iyoda, M.*; Kim, D.* *Chem. Eur. J.* **2013**, *19*, 9699-9709. (10.1002/chem.201300313)
- (6) Antiaromatic planar cyclooctatetraene: a strategy for ambipolar semiconductors in field effect transistors
Nishinaga, T.*; Ohmae, T.; Aita, K.; Takase, M.; Iyoda, M.; Arai, T.; Kunugi, Y.* *Chem. Commun.* **2013**, *49*, 5354-5356. (10.1039/c3cc41764f)
- (7) Steric Control in the p-Dimerization of Oligothiophene Radical Cations Annelated with Bicyclo[2.2.2]octene Units
Tateno, M.; Takase, M.; Iyoda, M.; Komatsu, K.; T. Nishinaga* *Chem. Eur. J.* **2013**, *19*, 5457-5467. (10.1002/chem.201204332)
- (8) Solvent-induced Crystalline State Emission and Multichromism of Bent p-Surface System Composed of Dibenzocyclooctatetraene Units

- Nishiuchi, T.; Tanaka, K.; Kuwatani, Y.; Sung, J.; Nishinaga, T.; Kim, D.*; Iyoda, M.* *Chem. Eur. J.* **2013**, *19*, 4110-4116. (10.1002/chem.201203952)
- (9) Giant Conjugated Macrocycles: Synthesis and Applications
Iyoda, M.* *J. Synth. Org. Chem. Jpn.* **2012**, *70* (11), 1157-1163.
- (10) Self-Assembly, Chromic Properties, and Nanostructure Formation of Tetrathiafulvalene-fused Dodecadehydro[18]annulenes
Enozawa, H.; Takahashi, T.; Nishinaga, T.; Kato, T.; Hasegawa, M.; Iyoda, M.* *Bull. Chem. Soc. Jpn.* **2012**, *85*, 1120-1137. (10.1246/bcsj.20120135)
- (11) Syntheses, molecular structures, and biological activities of 1- and 2-(2'-deoxy-D-ribofuranosyl)cyclohepta[*d*][1,2,3]triazol-6(1*H*)-ones and 1-(2'-deoxy-D-ribofuranosyl)cyclohepta[*b*]pyrrol-8(1*H*)-ones
Nakazawa, T.*; Ohmae, T., Fujimuro, M.; Ito, M.; Nishinaga, T.; Iyoda, M.* *Tetrahedron* **2012**, *68*, 3221-3224. (10.1016/j.tet.2012.04.109)
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- (13) Face-to-Face Arranged Dimeric Tetrathiafulvalenes and Their Cation Radical and Dication Species as Models of Mixed Valence and p-Dimer States
Hasegawa, M.*; Daigoku, K.; Hashimoto, K.; Nishikawa, H.; Iyoda, M.* *Bull. Chem. Soc. Jpn.* **2012**, *85*, 51-60. (10.1246/bcsj.20110224)
- (14) Gold nanoparticle-templated assembly of oligothiophenes: preparation and film properties
Saitou, K.; Nishiyabu, R.; Iyoda, M.; Kubo, Y.* *Tetrahedron* **2011**, *67*, 9685-9689. (10.1016/j.tet.2011.10.032)
- (15) Synthesis and structural, electronic, optical and FET properties of thiophene-pyrrole mixed hexamers end-capped with phenyl and pentafluorophenyl groups
Nishinaga, T.*; Miyata, T.; Tateno, M.; Koizumi, M.; Takase, M.; Iyoda, M.; Kobayashi, N. Kunugi, Y.* *J. Mater. Chem.* **2011**, *21*, 14959-14966. (10.1039/c1jm12966j)
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Takase, M.*; Yoshida, N.; Nishinaga, T.; Iyoda, M.* *Org. Lett.* **2011**, *13*, 3896-3899. (10.1021/ol2014279)
- (17) Structural, Optical, and Electronic Properties of a Series of 3,4-Propylenedioxythiophene Oligomers in Neutral and Various Oxidation States

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- (18) Hanai, Y.; Rahman, M. J.; Yamakawa, J.; Takase, M.; Nishinaga, T.; Hasegawa, M.; Kamada, K.; Iyoda, M.*
Synthesis and Nanostructures of Cyclic Triphenylene Trimers Having Long Alkyl and Alkoxy Side Chains
Chem. Asian J. **2011**, *6*, 2940-2945. (10.1002/asia.201100336)
- (19) Nano-Sized to Giant Conjugated Macrocycles: New Concepts and Versatile Applications
Iyoda, M.*; Yamakawa, J.; Rahman, M. J. *Angew. Chem. Int. Ed.* **2011**, *50*, 10522-10553. (10.1002/anie.201006198)
- (20) Probing Coherence in Synthetic Cyclic Light-Harvesting Pigments
Donehue, J. E.; Varnavski, O. P.; Cemborski, R.; Iyoda, M.; Goodson III, T.* *J. Am. Chem. Soc.* **2011**, *133*, 4819-482. (10.1021/ja108359w)
- (21) Self-assembly and nanostructure formation of amphiphilic 4,5-bis(2-pyridylethynyl)-tetrathiafulvalenes
Isomura, E.; Nishinaga, T.; Iyoda, M.* *Supramolecular Chem.* **2011**, *23*, 304-309. (10.1080/10610278.2010.527978)
- (22) McMurry Coupling of Diformyldithienylacetylene: Synthesis of [24]-, [36]-, and [48]annulenes Composed of Thiophene, Acetylene, and Ethylene Units
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Ahn, S.; Kim, Y.; Beak, S.; Ishimoto, S.; Enozawa, H.; Isomura, E.; Hasegawa, M.; Iyoda, M.*; Park, Y.* *J. Mater. Chem.* **2010**, *20*, 10817-10823. (10.1039/c0jm02628j)
- (24) Biradical Character of Linear p-Conjugated Oligomer Dications Composed of Thiophene, Pyrrole and Methylthio End-Capping Units
Nishinaga, T.*; Tateno, M.; Fujii, M.; Fujita, W.; Takase, M.; Iyoda, M. *Org. Lett.* **2010**, *12*, 5374-5377. (10.1021/ol101997w)
- (25) Shape-controllable gold nanocrystallization using an amphiphilic polythiophene
Minami, T.; Nishiyabu, R.; Iyoda, M.; Kubo, Y.* *Chem. Commun.* **2010**, *46*, 8603-8605. (10.1039/c0cc3179h)
- (26) Star-Shaped Oligothiophenes with Unique Photophysical Properties and Nanostructures
Narita, T.; Takase, M.; Nishinaga, T.; Iyoda, M.*; Kamada, K.*; Ohta, K. *Chem. Eur. J.* **2010**, *16*, 12108-12113. (10.1002/chem.201001413)

- (27) An Efficient Synthesis of Chiral Isoquinuclidines by Diels-Alder Reaction Using Lewis Acid Catalyst
Hirama, M.; Kato, Y.; Seki, C.; Nakano, H.; Takeshita, M.; Oshikiri, N.; Iyoda, M.; Matsuyama H.* *Tetrahedron* **2010**, *66*, 7618-7624. (10.1016/j.tet.2010.07.026)
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- (29) Synthesis and Properties of Thienylene-Ethynylene-Tetrathiafulvalene Oligomers
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- (30) Synthesis and Properties of Octithiophene Dication Sterically Segregated by Annulation with Bicyclo[2.2.2]octene Units
Nishinaga, T.*; Yamazaki, D.; Tateno, M.; Iyoda, M.; Komatsu K. *Materials* **2010**, *3*, 2037-2052. (10.3390/ma3032037)
- (31) Fully Conjugated Macrocycles Composed of Thiophenes, Acetylenes, and Ethylenes
Iyoda, M.* *Pure Appl. Chem.* **2010**, *82*, 831-841. (10.1351/PAC-CON-09-11-01)
- (32) Structural, electronic and magnetic properties of Cu(II) complexes of 2-substituted tropones bearing ferrocenyl group at 5-position
Nishinaga, T.*; Aono, T.; Isomura, E.; Watanabe, S.; Miyake, Y.; Miyazaki, A.; Enoki, T.; Miyasaka, H.; Otani, H.; Iyoda, M.* *Dalton Trans.* **2010**, *39*, 2293-2300. (10.1039/b912255a)
- (33) Synthesis and p-Amphoteric Properties of Tris(tetrathiafulvaneno)hexadehydro-[12]annulene
Hara, K.; Hasegawa, M.; Kuwatani, Y.; Enozawa, H.; Iyoda, M.* *Heterocycles* **2010**, *80*, 909-915. (10.3987/COM-09-S(S)122)
- (34) Recent Studies on the Aromaticity and Antiaromaticity of Planar Cyclooctatetraene
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- (35) Cyclic Tetrathiophenes Planarized by Silicon and Sulfur Bridges Bearing an Antiaromatic Cyclooctatetraene Core: Syntheses, Structures, and Properties
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- (36) Synthesis of bitetrathiafulvalenes with FeCl₃-mediated homo-coupling of tetrathiafulvalenyl- magnesium chloride and molecular fiber formation from tetrakis(dodecylthio)tetrathiafulvalene
Honna, Y.; Isomura, E.; Enozawa, H.; Hasegawa, M.; Takase, M.; Nishinaga, T.; Iyoda, M.* *Tetrahedron Lett.* **2010**, *51*, 679-682. (10.1016/j.tetlet.2009.11.106)

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- (1) 導電性超分子ワイヤー - テトラチアフルバレンから作られるナノ材料 -
伊與田正彦*, マテリアルステージ, 2013年3月号, 3-5.
- (2) 可溶性置換基をもつ 3,4-ジオキシチオフェンオリゴマーの合成と基礎物性
西長亨、伊與田正彦* 「PEDOT の材料物性とデバイス応用」監修 奥崎秀憲典、サイエンス&テクノロジー、2012, pp 24-30.
- (3) Conjugated Molecular Belts Based on 3-D Benzannulene Systems
Iyoda, M.*; Kuwatani, Y.; Nishinaga, T.; Takase, M.; Nishiuchi, T. In *Fragments of Fullerenes and Carbon Nanotubes: Designed Synthesis, Unusual Reactions, and Coordination Chemistry*, Eds. Petrukhina, M. A.; Scott, L. T., Wiley-VCH, 2012, pp 311-342.
- (4) 有機巨大環状化合物の合成と機能
伊與田正彦*, OM ニュース、2012 (1), 10-15.
- (5) 導電性超分子ナノ集積体の構築と機能
長谷川真士、伊與田正彦*、ファインケミカル、2011, 40(3), 29-35.
- (7) 有機分子のナノ集積体化学
伊與田正彦*、ファインケミカル、2011, 40(3), 5-6.

2 . 学会発表等 (国内外の招待講演および国際会議での発表状況)

- (1) Nano-sized to Giant Conjugated Macrocycles: Synthesis and Versatile Applications,
Shimizu, H.; Rahman, M. J.; Iyoda, M., ISIS-8, Nara, 2013.11.29-12.1 (ポスター発表).
- (2) 機能性有機 電子系と歩む、伊與田正彦、早稲田大学講演会、早稲田大学、東京、2012.11.12 (招待講演) .
- (3) Nanostructure Formation and Functional Properties of Macrocyclic Oligothiophene 6 and 8-mers
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- (4) Synthesis of Pentadecaphenylenes, Its Inclusion Properties, and Nanostructure Formation with C₆₀
Shimizu, H.; Rahman, M. J.; Arai, Y.; Ikeda, H.; Iyoda, M. the 15th Internal Symposium on Novel Aromatic Compounds, Taipei, Taiwan, 2013.7.28-8.2 (ポスター発表)
- (5) 大環状オリゴチオフェン - 合成とその特異な物性
伊與田正彦、大阪府立大学白鷺セミナー第 65 回講演会、大阪府立大学、堺、2012.10.26 (招待講演) .

- (6) Nanostructure Formation and Functional Properties of Giant Macrocyclic Oligothiophenes
Iyoda, M. 2nd International Conference on Nanotek and Expo, Philadelphia, Pennsylvania, USA, 2012.12.3-5 (招待講演) .
- (7) 新しい環状 π 電子系の構築と機能に関する研究
伊與田正彦、第6回有機 π 電子系シンポジウム、松山、愛媛、2012.12.14 (招待講演) .
- (8) Synthesis of Macrocyclic Oligothiophene 4n-mers and Photochromism of 8-mer,
Shimizu, H.; Haque, T.; Tabata, C.; Takase, M.; Nishinaga, T.; Nomura, K.; Iyoda, M.,
International Symposium on Nano Science and Functional Materials: Post-symposium of
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10 (ポスター発表).
- (9) Synthesis of Macrocyclic Pentadecaphenylene and its Functional Properties, Rahman, M.
J.; Shimizu, H.; Iyoda, M., International Symposium on Nano Science and Functional
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- (10) Self-Organization of Nano-Sized to Giant Conjugated Macrocycles: Synthesis and
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- (12) Conducting Supramolecular Nanofibers and Nanorods, Iyoda, M.,
The International Symposium on Carbon Electronics (ISCE) & The STINT Summer
School 2011, Seoul National University, Seoul, Korea, 2011, 5, 9-14 (招待講演) .
- (13) 有機巨大環状化合物の合成と機能、伊與田正彦
近畿化学協会有機金属部会平成23年度第一回例会、大阪、平成23年4月15日
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- (14) Self-organization of fully conjugated macrocycles: synthesis and functional properties
Iyoda, M. The 2010 International Chemical Congress of Pacific Basin Societies
(Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20 (口頭発表) .
- (15) Synthesis, properties, and self-assembling behaviors of cyclic triphenylene trimer with
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Hanai, Y.; Rahman, M. J.; J. Yamakawa, T. Nishinaga, M. Takase, M. Iyoda The 2010
International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu,
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- (16) Supramolecular nanostructures based on self-assembly of C_{2v} symmetric triphenylene derivatives: formation of nanofibers, nanorings, and nanotubes
Yamakawa, J.; Nishinaga, T.; Iyoda, M. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20 (ポスター発表) .
- (17) Electrical conductivities and morphologies of TTF-4,5-bis(alkylamide)s bearing long alkylthio groups in neutral and oxidation states
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- (18) Synthesis and optical properties of star-shaped oligothiophenes
Narita, T.; Takase, M.; Nishinaga, T.; Iyoda, M.; Kamada, K.; Ohta, K. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20 (ポスター発表) .
- (19) Steric control of π -dimerization of oligothiophene radical cations
Tateno, M.; Nishinaga, T.; Takase, M.; Komatsu, K.; Iyoda, M. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20 (ポスター発表) .
- (20) Facile synthesis and properties of dithieno[a,c]anthracene derivatives
Takase, M.; Haseyama, K.; Nishinaga, T.; Iyoda, M. The Sixth International Symposium on Integrated Synthesis (ISIS-6), Kobe, 2010,10 (ポスター発表) .
- (21) Conducting Supramolecular Nanofibers and Nanorods
Iyoda, M. The 11th Eurasia Conference, the dead sea, Jordan, 2010.10.6-10 (口頭発表) .
- (22) Steric control of π -dimerization of oligothiophene radical cations
Tateno, M.; Nishinaga, T.; Takase, M.; Iyoda, M. The 2nd TMU/SNU Joint Seminar on Nano-Science and Related Topics, 2010.8, Tokyo (ポスター発表) .
- (23) Star-shaped pyrrole-fused tetrathiafulvalenes: Synthesis and redox, self-assembling, and conductive properties
Yoshida, N.; Takase, M.; Nishinaga, T.; Iyoda, M. The 2nd TMU/SNU Joint Seminar on Nano-Science and Related Topics, 2010.8, Tokyo (ポスター発表) .

3 . 特許

無し

4 . 学会・シンポジウム等の開催状況

無し

5 . 受賞等

- (1) 伊與田正彦(公募班員)有機 電子系学会 学会賞、有機 電子系シンポジウム、
2012.12.14
- (2) 伊與田正彦(公募班員)
日本化学会学術賞 第92回日本化学会年会、2012.3.26
- (3) 長谷川真士(北里大学理学部助教)、伊與田正彦(公募班員)
Face-to-Face Arranged Dimeric Tetrathiafulvalenes and Their Cation Radical and
Dication Species as Models of Mixed Valence and p-Dimer States, *Bull. Chem. Soc. Jpn.*
2012, 85 (1), 51-60.
BCSJ 賞受賞

6 . 新聞報道等

無し

7 . 国民との科学・技術対話

- (1) 愛知県岡崎高校同窓生を対象(25名、男20名、女5名)、2013年6月19日、化学物質に関して講演、東京都産業労働局秋葉原庁舎会議室、アンケート・評価等を行っていない。

8 . 領域内の共同研究の準備・実施状況とその成果

- (1) 共同研究先：大阪大学，戸部研究室(A03班)
共同研究内容：走査型トンネル顕微鏡(STM)を用いた 拡張大環状オリゴチオフェンの観察