

研究期間全年度 研究業績

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1 . 発表論文等 (査読付き論文, 著書, 総説等の発表状況)

- (1) Photoinduced Charge Separation of New Donor-bridge-acceptor Systems with [2.2]Paracyclophane as a Bridge, Phenothiazine (D)- [2.2]Paracyclophane (B)-2,1,3-Benzothiadiazole (A) and Carbazole (D)-[2.2]Paracyclophane (B)-Naphthalimide (A) with Alkyl Tethers
Miyazaki, T.; Fujishige, J.; Fujitsuka, M.; Majima, T.; Shibahara, M.; Watanabe, M.; Goto, K.; Shinmyozu, T.* to be submitted.
- (2) Synthesis, Structure, and Electronic Properties of Ethynyl-substituted Pyromellitic Diimide- Based Macrocycles as Structural Units of Molecular Tube
Tao, K.; Sako K.; Goto, K.; Shinmyozu, T.* to be submitted.
- (3) Photochemical Reaction of [3₂](1,4)Cyclophane: Formation of Cyclophane Dimers
Hakoshima, Y.; Okamoto, H.; Gotom K.; Shimasaki, T.; Hua, Z.; Miyazaki, T.; Ershad, H. Md.; satake, K.; Yamaji, M.; Shibahara, M.; Shinmyozu, T.* *J. Org. Chem.* submitted.
- (4) Synthesis, Structure, Photophysical, and Electronic Properties of [3.3.n](1,3,5)-Cyclophanes with a -(Me₂Si)_n- Bridge (n = 2-4)
Yuan, C.; Hua, Z.; Sun, L.; Miyazaki, T.; Yamaji, M.; Goto, K.; Shinmyozu, T.* *J. Org. Chem.* submitted.
- (5) Synthesis of Pyromellitic Diimide-Based Macrocycles by a Combination of Microflow and Batch Reactions and Their Spectral and Redox Properties
Tao, K.; Kittaka, N.; Iwanaga, T.; Sako, K.; Goto, K.; Shinmyozu, T.* *Synthesis* submitted.
- (6) Photoinduced Color Change and Photomechanical Effect of Naphthalene Diimides Bearing Alkylamine Moieties in the Solid State
Matsunaga, Y.; Goto, K.; Kubono, K.; Sako, K.; Shinmyozu, T.* *Chem. Eur. J.* in press. (10.1002/chem.201304849)
- (7) Synthesis, Physical Properties, and Structure of TIPS- Difuranoacenes
Watanabe, M.; Chien, C-T.; Lin, Y-D.; Chang Y. J.; Wen, Y-S.; Goto, K.; Shibahara, M.; Shinmyozu, T.; Chow, T. J. *Tetrahedron Lett.* **2014**, 55, 1424-1427. (10.1016/j.tetlet.2014.01.036)
- (8) Selective Alcohol Adsorption in a Uniformly Ordered Array of Lipophilic Mesopores by a Giant Macrocycle

- Uchise, T.; Goto, K.;* Harano, A.; Shinmyozu, T.* *RSC Advances* **2014**, *4*, 6014-6018. (10.139/c3ra45716h)
- (9) Synthesis and Properties of Novel Crown Ether-annelated 4',5'-Diaza-9'-(1,3-dithiole-2-ylidene)fluorenes and Their Ruthenium(II) Complexes
Sako, K.; Kakehi, T.; Nakano, S.; Oku, H.; Shen, X. F.; Iwanaga, T.; Yoshikawa, M.; Sugahara, K.; Toyota, S.; Takemura H.; Shinmyozu, T.; Shiotsuka, M.; Tatemitsu, H. *Tetrahedron Lett.* **2014**, *55*, 749-752. (10.1016/j.tetlet.2013.12.013)
- (10) Dynamical Excimer Formation in Rigid Carbazolophane via Charge Transfer State
Tamai, Y.; Ohkita, H.; Shimada, J.; Benten, H.; Ito, S.; Yamanaka, S.; Hisada, K.; Tani, K.; Kubono, K.; Shinmyozu, T. *J. Phys. Chem. A* **2013**, *117*, 7776-7785. (10.1021/jp402126a)
- (11) Measurement and Analysis of the Infrared Absorption Spectrum of the Radical Cation of [34](1,2,4,5)Cyclophane: Observation of Electron-molecular Vibration Interaction Between Two Benzene Moieties
Sakamoto, A.; Tanaka N.; Shinmyozu, T. *Chemical Physics*, **2013**, *419*, 266-273.
- (12) Synthesis, Crystal Structure and Charge Transporting Properties of Hexacene
Watanabe, M.; Chang, Y. J.; Liu, S-W., Chao, T-H., Goto, K.; Islam, Md. Minarul, Yuan, C-H., Tao, Y-T.; Shinmyozu, T.; Chow, T. J., *Nature Chemistry*, **2012**, *4*, 574-578. (10.1038/NCHEM.1381)
- (13) Synthesis, Optical Properties, and Electronic Structures of Fully Core-Modified Porphyrin Dications and Isophlorins
Kon-no, M.; Mack, J.; Kobayashi, N.; Suenaga, M.; Yoza, K.; Shinmyozu, T. *Chemistry A Eur. J.* **2012**, *18*, 13361-13371. (10.1002/chem..201200776)
- (14) Synthesis and Redox Properties of Pai-conjugated 4,5-Diazafluorene Derivatives Incorporating 9-Cyanomethylene Moiety as an Electron Acceptor
Sako, K.; Mugishima, Y.; Iwanaga, T.; Toyota, S.; Takemura, H.; Watanabe, M.; Shinmyozu, T.; Shiotsuka, M.; Hitoshi Tatemitsu. *Tetrahedron Lett.* **2011**, *52*, 5865-5868. (10.1016/j.tetlet.2011.08.164)
- (15) Structural Properties of Charge-Transfer Complexes of Multilayered [3.3]Paracyclophanes
Shibahara, M.; Watanabe, M.; Chang, Y.; Goto, K.; Shinmyozu, T. *Tetrahedron Lett.* **2011**, *52*, 5012-5015. (10.1016/j.tetlet.2011.07.060)
- (16) Changing Volume of a Giant Macrocycle: The Swelling of the Macrocycle with Organic Solvents

- Harano, A.; Tanaka, M.; Nakagaki, T.; Annaka, M.; Ideta, K.; Goto, K.; Shinmyozu, T. *Org. Biomol. Chem.* 2011, 9, 3611-3614. (10.1039/c1ob05272a)
- (17) Quinoxaline-embedded Polyacenoquinone Esters: Synthesis, Electronic Properties, and Crystal Structure
Chou, T-C.; Lin, K-C.; Kon-no, Y.; Lee, C-C.; Shinmyozu, T. *Organic Lett.* **2011**, *13*, 4588-4591. (10.1021/ol2017774)
- (18) Solution-processed Organic Micro Crystal Transistor Based on Tetraceno[2,3-b]-thiophene from a Monoketone Precursor
Watanabe, M.; Cho, T-H.; Liu, S-W.; Chien, C-T.; Chang, Y. J.; Yuan, C-H.; Huang, K-C.; Shinmyozu, T.; Chow, T. J. *Journal of Material Chemistry*, **2011**, *21*, 11317-11322. (10.1039/C1JM11834J).
- (19) Structural Properties of Charge-transfer Complexes of Four- and Five-layered [3.3]-Metacyclophanes
Shibahara, M.; Watanabe, M.; Yuan, Chang.; Shinmyozu, T. *Tetrahedron Lett.* **2011**, *52*, 5012-5015. (10.1016/j.tetlet.2011.07.060)
- (20) 1,4-Dialkynylbutatrienes: Synthesis, Stability, and Perspectives in the Chemistry of Carbo-benzenes
Maraval, V.; Leroyer, L.; Harano, A.; Barthes, C.; Saquet, A.; Duhayon, C.; Shinmyozu, T.; Chauvin, Remi. *Chem. Eur. J.* **2011**, *17*, 5086-5100. (10.1002/chem..201002769)
- (21) N-(4-Phenylbutyl)azacalix[3.1.1.1]arene: Self-inclusion of the Side Chain Through CH... π Interactions
Takemura, H.; Yonebayashi, Y.; Nakagaki, T.; Shinmyozu, T. *Eur. J. Org. Chem.* 2011, 1968-1971. (10.1002/ejoc.201001460)
- (22) Facile Synthesis of 3-(Succinimid-3-yl)-2-oxo-2,3-dihydroimidazolo[1,2-a]pyridine Derivatives by Sequential Intra- and Intermolecular Michael Reactions Between 2-Aminopyridines and Mleimides
Shimo, T.; Itoh, T.; Araki, Y.; Iwanaga, T.; Shinmyozu, T.; Somekawa, K. *Heterocycles*, 2011, 83, 47-55. (10.3987/COM-10-12072)
- (23) Delocalization of Positive Charge in π -Stacked Multilayered Rings in Multilayered Cyclophanes
Fujitaska, M.; Tojo, S.; Shibahara, M.; Watanabe, M.; Shinmyozu, T.; Majima T. *J. Phys. Chem. A* **2011**, *115*, 741-746. (10.1021/jp110916m)
- (24) Formation of Nanoporous Fibers by the Self-assembly of Pyromellitic Diimide-based Macrocycle

- Nakagaki, T.; Harano, A.; Fuchigami, Y.; Tanaka, E.; Kidoaki, S.; Okuda, T.; Iwanaga, T.; Goto, K.; Shinmyozu, T.* *Angew. Chem. Int. Ed.* **2010**, *49*, 9676-9679.
(10.1002/anie.201004992)
- (25) 2,1,3-Benzothiadiazole Dimers: Preparation, Structure, and Transannular Electronic Interactions of syn- and anti-[2.2](4,7)Benzothiadiazolophanes
Watanabe, M.; Goto, K.; Fujitsuka, M.; Tojo, S.; Majima, T.; Shinmyozu, T.* *Bull. Chem. Soc. Jpn.* **2010**, *83*, 1155-1161 (BCSJ Award Article) (10.1246/bcsj.20100085)
- (26) Synthesis, Structure, and Electronic and Photophysical Properties of Two- and Three-layered [3.3]Paracyclophane-based Donor-acceptor System
Watanabe, M.; Goto, K.; Shibahara, M.; Shinmyozu, T.* *J. Org. Chem.* **2010**, *75*, 6104-6114. (10.102/jo100688m)
- (27) A spherical Molecular Assembly Formed by the Interplay of Hydrophobic and Hydrogen Bonding Interactions. Formation of a Hexameric Ball
Goto, K.; Miyahara, Y.; Shinmyozu, T. *Tetrahedron Lett.* **2010**, *51*, 832-835.
(10.1016/j.tetlet.2009.12.012)
- (28) Molecular Recognition of Polymethoxybenzenes by Host Molecule Comprised of Two Pyromellitic Diimides and Two Dialkoxynaphthalenes
Nakagaki, T.; Kato, S-I, Harano, A.; Shinmyozu, T. *Tetrahedron*, **2010**, *66*, 976-985.
(10.1016/j.tet.2009.11.087)
- (29) Stable-ion NMR Spectroscopy and GIAO-DFT Study of Carbocations Derived from Multibridged [3_n]Cyclophanes
Laali, K. K.; Okazaki, T.; Kitagawa, T.; Shinmyozu, T. *Eur. J. Org. Chem.* **2009**, 24451-4457. (10.1002/ejoc.200900479)
- (30) Intramolecular Dimer Radical Anions of [3_n]Cyclophanes: Transannular Distance Dependent Stabilization Energy
Fujituka, M.; Tojo, S.; Shinmyozu, T.; Majima, T. *Chem. Commun.* **2009**, 1553-1555.
(10.1039/b810122a)
- (31) Conformational Study of [3.3](3,5)Pyridinophanes
Shibahara, M.; Watanabe, M.; Suenaga, M.; Ideta, K.; Matsumoto, T.; Shinmyozu, T. *Tetrahedron Lett.* **2009**, *50*, 1340-1344.

著書

- (1) Synthesis, Structure, and Electronic and Photophysical Properties of Donor-Acceptor Cyclophanes
Shibahara, M.; Watanabe, M.; Miyazaki, T.; Fujishige, J-i.; Matsunaga, Y.; Tao, K.;

Zhang H.; Goto, K.; Shinmyozu, T. In *Organic Structure Design: Applications in Optical and Electronic Devices*; Editor Chow, J. T. Pan Stanford Publishing Pte. Ltd.: Singapore, 2014; Chapter 3, in press.

(2) Mononuclear Cyclophanes

Shinmyozu, T.; Shibahara, M. In *Science of Synthesis*; Volume Editor Siegel, J. S.; Tobe, Y. Georg Thieme Verlag KG.: Stuttgart, New York, 2010, 45.28. Product Class 28, Houben-Weyl 45b, 1267-1310.

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) A Study of a Donor-Bridge (Multilayered [3.3]cyclophane)-Acceptor System as a New Molecular Wire

Shinmyozu T. 2nd Korea-Taiwan Bilateral Symposium on Materials Chemistry and Solar Energy Utilization, Yangpyeong, Korea, 2009.10.23-27 (invited).

(2) Synthesis and Photophysical and Inclusion Properties of Giant Capsule Molecules

Shinmyozu T. 2009 Taipei-Shanghai Symposium on Materials Chemistry, Institute of Chemistry, Academia Sinica, Taiwan, 2009.11.28-29 (invited).

(3) A Study on Charge Transfer Interaction Using Cyclophanes as Model Compounds

Shinmyozu T. Symposium on Creation of Functional Materials 2009, University of Tsukuba, Japan, 2009.12.3-4 (招待講演) .

(4) Inclusion Phenomena of the Cyclophanes as The Structural Units of Molecular Tubes

Shinmyozu T. The 4th Taiwan-Japan Bilateral Symposium on Architecture of Functional Organic Molecules, Fukuoka, Japan, 2009.8.17-19 (invited).

(5) Synthesis of New 3D Host Molecules: Construction of Organic Tubes and Capsules and Their Inclusion Phenomena

Shinmyozu, T. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20 (invited).

(6) Synthesis, Structure, and Electronic and Photophysical Properties of Two- and Three-layered [3.3]Paracyclophane-based Donor-Acceptor Systems

Watanabe, M.; Goto, K.; Shibahara, M.; Liao, Y.; Hsu, C-P, Chow, T. J.; Shinmyozu, T., 5th Taiwan-Japan Bilateral Symposium on Architecture of Functional Organic Molecules, 2010.10.18-19, Taiwan (invited).

(7) Synthesis, Structure, Electrochemical Properties, and Electronic Structure of Tetrathiaporphyrin Dications (18p) and Tetrathiaisophlorin (20p)

- M. Kon-no, Mack, J.; Kobayashi, N.; Yoza, K.; M. Suenaga, T. Shinmyozu, 6th Taiwan-Japan Bilateral Symposium on Architecture of Functional Organic Molecules, 8. 20, Hiroshima University (2011) (Invited).
- (8) A Study of π -Stacked Molecular Wires: Synthesis and Electronic and Photophysical Properties of Donor-Bridge(cyclophane)-Acceptor Systems
Shinmyozu, T.; Miyazaki, T.; Fujishige, J-i.; Watanabe, M.; Shibahara, M.; Goto, K.; Fujitsuka, M.; Tojo, S.; Majima, T. 14th Asian Chemical Congress 2011, 9.5-9.8, Bangkok, Thailand (2011) (Invited).
- (9) A Fundamental Study on π -Stacked Molecular Wires: Synthesis and Electronic and Photophysical Properties of Donor-Bridge(cyclophane)-Acceptor Systems
Shinmyozu, T. The 3rd Taiwan-Korea Bilateral Symposium, 9. 5, National Dong Hwa University, Hualien, Taiwan (2011) (invited).
- (10) チューブ状分子の構成単位としてのピロメリット酸ジイミド基盤マクロサイクル類の合成と性質
新名主輝男、有機合成化学協会九州山口支部第 24 回若手研究者のためのセミナー、九州大学馬出キャンパス、8 月 25 日(2012) (招待講演)。
- (11) Synthesis, Structure, and Electronic Properties of Bromo- and Ethynyl-substituted Pyromellitic Diimide-based Macrocycles as Structural Units of Molecular Tube
Tao, K.; Tian, A.; Bandyopadhyay, A.; Goto, K.; Shinmyozu, T. 7th Taiwan-Japan Bilateral Symposium on Architecture of Functional Organic Molecules, 10.21-24, National Chiao Tung University, Taiwan (2012) (invited).
- (12) Synthesis and Inclusion Phenomena of Novel Pyromellitic Diimide-based Macrocycles as Structural Units of Molecular Tubes
Shinmyozu, T. The 7th BK21 international symposium on materials chemistry 2012, 12.2, Busan, Korea (2012) (invited).
- (13) Photoinduced Radical Anion Formation and Photomechanical Effect of Naphthalene Diimides Bearing Alkylamine Moieties in Crystalline State
Shinmyozu, T. 2013 Korea-Japan Symposium on Frontier Photoscience, 11. 25-27, Seoul National University, Seoul, Korea (2013) (invited).
- (14) Synthesis and Properties of Novel Pyromellitic Diimide-based Macrocycles as Structural Units of Molecular Tubes
Shinmyozu, T. 1st Kansai Nanoscience and Technology International Symposium, 2.3-4, Senri Life Science Center, Osaka (2014) (invited).

3 . 特許

なし

4 . 学会・シンポジウム等の開催状況

- (1) 第3回有機 π 電子系シンポジウム、別府、2009.12.4-5 (新名主輝男、実行委員長).
- (2) 5th Taiwan-Japan Bilateral Symposium on Architecture of Functional Organic Molecules, 2010.10.18-19, Taiwan (日本側組織委員)
- (3) 新学術領域研究「反応集積化の合成化学 革新的手法の開拓と有機物質創製への展開」第3回若手シンポジウム(九州地区)九州大学、2011.2.5 (世話人)

5 . 受賞等

- (1) 中垣 武 (博士3年)
ベストポスター賞 20周年記念万有福岡シンポジウム(福岡) 2010.5.22.
- (2) 中垣 武 (博士3年)
優秀ポスター賞および特別講師賞 第42回構造有機若手の会(京都)、2010.8.8.
- (3) 原野 彩 (博士3年)
ポスター賞 第21回基礎有機化学討論会(名古屋) 2010.9.10.
- (4) 渡邊源規、五島健太、藤塚 守、藤乗幸子、真嶋徹朗、新名主輝男(九大先導研・阪大産研)
Bulletin of the Chemical Society of Japan (BCSJ) Award Article
2,1,3-Benzothiadiazole Dimers: Preparation, Structure, and Transannular Electronic Interactions of syn- and anti-[2.2](4,7)Benzothiadiazolophanes
Bull. Chem. Soc. Jpn. **2010**, 83, 1155-1161. 2010.10.5 日本化学会
- (8) 松永佑規 (博士3年)
最優秀ポスター賞、第49回化学関連支部合同九州大会(北九州) 2012.6.30.
- (9) 新名主輝男
有機 π 電子系学会賞、有機 π 電子系学会、2012.12.14.

6 . 新聞報道等

なし

7 . 国民との科学・技術対話

- (1) SSH 実験・実習体験セミナー
熊本県立第二高等学校 第2学年、10名、2010.11.6, アンケート無、有機化学の講義及び実験

(2) 数理オリンピックセミナー（化学）

福岡県高校生代表 5名、2010. 11.23, 12. 6, 12. 13, 12. 20 (4日間)、アンケート実施

化学オリンピックで出題された比較的高度な化学を実験を通じて習得する。

(3) 数理オリンピックセミナー（化学）

福岡県高校生代表 5名、2011. 10.30, 11. 3, 11. 13, 11. 20 (4日間)、アンケート実施

化学オリンピックで出題された比較的高度な化学を実験を通じて習得する。

(4) 科学的思考力向上セミナー（化学）

福岡県高校生代表 7名、2012. 10.28, 11. 4, 11. 11, 11. 18 (4日間)、アンケート実施

化学オリンピックで出題された比較的高度な化学を実験を通じて習得する。

8 . 領域内の共同研究の準備・実施状況とその成果

なし