

研究期間全年度 研究業績

垣内喜代三 (奈良先端科学技術大学院大学物質創成科学研究科、A01 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) 標準プロセスによる偏光分析 CMOS イメージセンサの機能向上
徳田崇、藤岡侑司、宍戸三四郎、野田俊彦、笹川清隆、垣内喜代三、太田淳
映像情報メディア学会誌 **2011**, 65 (3), 367-371. (DOI:無し)
- (2) Diastereoselective [2+2] Photocycloaddition of Chiral Cyclic Enone and Cyclopentene Using a Microflow Reactor System
Tsutsumi, K.; Terao, K.; Yamaguchi, H.; Yoshimura, S.; Morimoto, T.; Kakiuchi, K.*; Fukuyama, T.; Ryu, I.* *Chem. Lett.* **2010**, 39, 828-829. (DOI: 10.1246/cl.2010.828)
- (3) Diastereodifferentiating [2+2] Photocycloaddition of Ethylene to Arylmethyl Cyclohexenones: Stacking-Driven Enhancement of the Product Diastereoselectivity Which Is Correlated with the Reactant Ellipticity
Tsutsumi, K.; Yanagisawa, Y.; Furutani, A.; Morimoto, M.; Kakiuchi, K.*; Wada, T.; Mori, T.; Inoue, Y.* *Chem. Eur. J.* **2010**, 16, 7488-7455. (DOI: 10.1002/chem.201000429)
- (4) Novel Photolabile Protecting Group for Phosphate Compounds
Zhang, Y.; Tanimoto, H.; Nishiyama, Y.; Morimoto, T.; Kakiuchi, K.*
Synlett **2012**, 23, 367-370. (DOI: 10.1055/s-0031-1290326)
- (5) Diastereoselective [2+2] Photocycloaddition of a chiral Cyclohexenone with Ethylene in a Continuous Flow Microcapillary Reactor
Terao, K.; Nishiyama, Y.; Tanimoto, H.; Morimoto, T.; Oelgemöller, M.; Kakiuchi, K.*
J. Flow Chem. **2012**, 2, 73-76. (DOI: 10.1556/JFC-D-12-00005)
- (6) Diastereodifferentiating [2+2] Photocycloaddition of Chiral Cyclohexenone Carboxylates with Cyclopentene by a Microreactor
Terao, K.; Nishiyama, Y.*; Aida, S.; Tanimoto, H.; Morimoto, T.; Kakiuchi, K.*
J. Photochem. Photobiol. A Chem. **2012**, 242, 13-19.
(DOI: 10.1016/j.jphotochem.2012.05.021)
- (7) Microflow photochemistry – a reactor comparison study using the photochemical synthesis of terebic acid as a model reaction
Aida, S.; Terao, K.; Nishiyama, Y.; Kakiuchi, K.; Oelgemöller, M.*
Tetrahedron Lett. **2012**, 53, 5578-5581. (DOI: 10.1016/j.tetlet.2012.07.143)
- (8) Highly diastereodifferentiating and regioselective [2+2]-photoreactions using methoxyaromatic menthyl cyclohexenone carboxylates

- Inhülsen, I.*; Akiyama, N.; Tsutsumi, K.; Nishiyama, Y.; Kakiuchi, K.*
Tetrahedron **2013**, *69*, 782-790. (DOI: 10.1016/j.tet.2012.10.074)
- (9) Diastereoselective [2+2] Photocycloaddition of Chiral Cyclic Enones with Olefins in Aqueous Media Using Surfactants
Nishiyama, Y.; Shibata, M.; Ishii, T.; Morimoto, T.; Tanimoto, H.; Tsutsumi, K.*; Kakiuchi, K.*
Molecules **2013**, *18*, 1626-1637. (DOI: 10.3390/molecules18021626)
- (10) CMOS sensor-based miniaturised in-line dual-functional optical analyser for high-speed, in situ chirality monitoring
Tokuda, T.*; Matsuoka, H.; Tachikawa, N.; Wakama, N.; Terao, K.; Shibata, M.; Noda, T.; Sasagawa, K.; Nishiyama, Y.; Kakiuchi, K.; Ohta, J.
Sensors and Actuators B: Chemical **2013**, *176*, 1032-1037.
(DOI: 10.1016/j.snb.2012.09.042)
- (11) Synthesis and Evaluation of a Chiral Menthol Functionalized Silsesquioxane: Application to Diastereoselective [2+2] Photocycloaddition
Yanagisawa, Y.; Yamaguchi, H.; Nishiyama, Y.; Morimoto, T.; Kakiuchi, K.*; Tabata, K.; Tsutsumi, K.*
Res. Chem. Intermed. **2013**, *39*, 101-110. (DOI: 10.1007/s11164-012-0635-5)
- (12) Image sensor pixel with on-chip high extinction ratio polarizer based on 65-nm standard CMOS technology
Sasagawa, K.*; Shishido, S.; Ando, K.; Matsuoka, H.; Noda, T.; Tokuda, T.; Kakiuchi, K.; Ohta, J.
Optic. Express **2013**, *21*, 11132-11140. (DOI: 10.1364/OE.21.011132)
- (13) Microflow photochemistry: UVC-induced [2+2]-photoadditions to furanone in a microcapillary reactor
Bachollet, S.; Terao, K.; Aida, S.; Nishiyama, Y.; Kakiuchi, K.; Oelgemöller, M.*
Beilstein J. Org. Chem. **2013**, *9*, 2015-2021. (DOI: 10.3762/bjoc.9.237)
- (14) Microflow Photochemistry -Acetone Sensitized Addition of Isopropanol to (5R)-5-Menthyloxy-2-(5H)-furanone
Aida, S.; Nishiyama, Y.; Kakiuchi, K.; Hoffmann, N.; Fon, A.; Oelgemöller, M.*
Rapid Commun. Photoscience **2013**, *2*, 68-71. (DOI: 10.5857/RCP.2013.2.2.68)
- (15) Polarisation analysing complementary metal-oxide semiconductor image sensor in 65-nm standard CMOS technology
Wakama, N.; Okabayashi, D.; Noda, T.; Sasagawa, K.; Tokuda, T.; Kakiuchi, K.; Ohta, J.*
The Journal of Engineering **2013**, doi: 10.1049/joe.2013.0033, 3 pp.

- (16) Highly efficient asymmetric Paterno-Buchi reaction in a microcapillary reactor utilizing slug flow
Terao, K.; Nishiyama, Y.; Kakiuchi, K.*
J. Flow Chem. **2014** in press. (DOI: 10.1556/JFC-D-13-00035)
- (17) Demonstrations of polarization imaging capability and novel functionality of polarization-analyzing CMOS image sensor with 65 nm standard CMOS process
Tokuda, T.; Sasagawa, K.; Wakama, N.; Noda, T.; Kakiuchi, K.; Ohta, J.
ITE Trans. On MTA **2014**, in press. (DOI:無し)

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) Development of New Photolabile Protecting Groups: Thiochromone *S,S*-dioxides
Kakiuchi, K. The 2nd International Forum on Photoenergy Future (IFPF), Honolulu, Hawaii, USA, 2010.12.21（招待講演）.
- (2) Polarization-analyzing CMOS image sensors with monolithically embedded wire grid structure
Tokuda, T.; Ohta, J.; Kakiuchi, K. 2010 CMOS Emerging and Technologies Workshop, Whistler, British Columbia, Canada, 2010.5-19-21（招待講演）.
- (3) Diastereoselective [2+2] Photocycloaddition of Chiral Cyclic Enone and Cyclopentene Using a Microflow Reactor System”,
Terao, K.; Tsutsumi, K.; Yamaguchi, H.; Yoshimura, S.; Morimoto, T.; Kakiuchi, K.; Fukuyama, T.; Ryu, I. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Honolulu, Hawaii, USA, 2010.12.15-20（ポスター発表）.
- (4) Entrainer effects on photosensitized enantiodifferentiating cyclization and isomerization in supercritical carbon dioxide,
Nishiyama, Y.; Saito, H.; Wada, T.; Inoue, Y.; Kakiuchi, 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）.
- (5) Diastereoselective [2+2] Photocycloaddition of Chiral Cyclic Enone Supported on Silsesquioxane with Ethylene
Yanagisawa, Y.; Yamaguchi, H.; Nishiyama, Y.; Tsutsumi, K.; Morimoto, T.; Kakiuchi, 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）.
- (6) Precise Control of Diastereoselective [2+2] Photocycloaddition in the Microflow System with in situ Analysis

- Terao, K.; Nishiyama, Y.; Morimoto, T.; Fujioka, F.; Tokuda, T.; Ohta, J.; Kakiuchi, K. GIST-NCTU-NAIST Joint Symposium 2010, Ikoma, Nara, 2010.11.15-16 (ポスター発表) .
- (7) Enantiodifferentiating Supramolecular Asymmetric [2+2] Photocycloaddition of Ethylene to Cyclic Enones
Yanagisawa, Y.; Nishiyama, Y.; Kakiuchi, K. The Photochemistry Gordon Research Conference, Easton, Massachusetts, USA, 2011.7.10-15 (ポスター発表) .
- (8) Diastereodifferentiating [2+2] Photocycloadditions using Photo-Microreactor
Nishiyama, Y.; Aida, S.; Terao, K.; Kakiuchi, K. The Seventh International Symposium on Integrated Synthesis (ISIS-7), Kobe, Hyogo, Japan, 2011.10.9-10 (ポスター発表) .
- (9) Photochemistry using Microreactor -Diastereodifferentiating [2+2] Photocycloadditions-
Nishiyama, Y.; Aida, S.; Terao, K.; Kakiuchi, K. 2011 Korea-Japan Symposium on Frontier Photoscience (2011 KJFP), Seoul, Korea, 2011.10.28-11.1 (口頭発表) .
- (10) Diastereoselective [2+2] Photocycloaddition in a Microflow System with On-line Analysis
Terao, K.; Matsuoka, H.; Nishiyama, Y.; Tokuda, T.; Noda, T.; Sasagawa, K.; Ohta, J.; Kakiuchi, K. 12th International Conferences on Microreaction Technology (IMRET12), Lyon, France, 2012.2.20-22 (ポスター発表) .
- (11) Real-time Multifunctional Optical Analyzer Based on Polarization-analyzing CMOS Image Sensor for Microchemical Systems
Wakama N.; Tachikawa, N.; Terao, K.; Shibata, M.; Noda, T.; Sasagawa, K.; Tokuda, T.; Nishiyama Y.; Kakiuchi, K.; Ohta, J. 2012 International Conference on Solid State Devices and Materials (SSDM2012), Kyoto, Japan, 2012.9.25-27 (ポスター発表) .
- (12) Highly Diastereodifferentiating and Regioselective [2+2] Photoreaction,
Inhülsen, I.; Nishiyama, Y.; Kakiuchi, K. 7th Asian Photochemistry Conference 2012 (APC 2012), Osaka, Japan, 2012.11.12-15 (ポスター発表) .
- (13) Building the Integrated Asymmetric Photoreaction System Using a Microcapillary Reactor and a New Monitoring Unit
Terao, K.; Wakama, N.; Tachikawa, N.; Nishiyama, Y.; Tokuda, T.; Ohta, J.; Kakiuchi, K. The Twelfth International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-12), Kyoto, Japan, 2012.11.12-16 (ポスター発表) .
- (14) Remarkable Substituent Effect on Highly Diastereodifferentiating and Regioselective [2+2] Photoreaction

- Inhülsen, I.; Nishiyama, Y.; Kakiuchi, K. The International Symposium on Green Photonics for Efficient Photon-Harvesting Materials and Reaction (ISGP2012), Ikoma, Japan, 2012.11.16 (ポスター発表) .
- (15) Building the Integrated Asymmetric Photoreaction System Using a Photo Micro Reactor and a New Monitoring Unit
Terao, K.; Wakama, N.; Tachikawa, N.; Nishiyama, Y.; Tokuda, T.; Ohta, J.; Kakiuchi, K. The International Symposium on Green Photonics for Efficient Photon-Harvesting Materials and Reaction (ISGP2012), Ikoma, Japan, 2012.11.16 (ポスター発表) .
- (16) A polarization-analyzing CMOS image sensor with metal wire grid in 65-nm standard CMOS technology for in-situ chiral analysis
Wakama, N.; Okabayashi, D.; Noda, T.; Sasagawa, K.; Tokuda, T.; Kakiuchi, K.; Ohta, J. Seventh International Conference on Molecular Electronics and Bioelectronics (M&BE7), Fukuoka, Japan, 2013.3.17-19 (ポスター発表) .
- (17) Application Demonstration Of Polarization-Analyzing CMOS Image Sensor and Performance Improvement Using 65 nm Standard CMOS Process
Tokuda, T.; Wakama, N.; Noda, T.; Sasagawa, K.; Kakiuchi, K.; Ohta, J. 2013 International Image Sensor Workshop (IISW2013), 5.09, Utah, USA, 2013.6.13 (ポスター発表) .
- (18) Application Demonstration of Polarization-Analyzing CMOS Image Sensor for Micro-Chemical Systems
Wakama, N.; Uejima, K.; Terao, K.; Noda, T.; Sasagawa, K.; Tokuda, T.; Nishiyama, Y.; Kakiuchi, K.; Ohta, J. International Conference on BioSensors, BioElectronics, BioMedical Devices, BioMEMS/NEMS and Applications 2013 (Bio4Apps 2013) , PE-2, Tokyo, Japan, 2013.10.30 (ポスター発表) .
- (19) A palm-sized in-line optical measurement device with polarization-analyzing CMOS image sensor for in situ chiral analysis
Wakama, N.; Uejima, K.; Terao, K.; Noda, T.; Sasagawa, K.; Tokuda, T.; Nishiyama, Y.; Kakiuchi, K.; Ohta, J. GIST-NCTU-NAIST International Joint Symposium 2013, Ikoma, Japan, 2013.11.21 (ポスター発表)
- (20) Highly Efficient Asymmetric Photoreactions using Microflow Reactors
Terao, K.; Aida, S.; Nishiyama, Y.; Kakiuchi, K. The 9th Korea-Japan Symposium on Frontier Photoscience - 2013, Seoul, Korea, 2013.11.24-27 (招待講演) .

3. 特許

なし

4. 学会・シンポジウム等の開催状況

- (1) 第 6 回集積有機合成国際シンポジウム (ISIS-6), 兵庫, 2010.10.23-24 (垣内喜代三, 組織委員).
- (2) 第 7 回集積有機合成国際シンポジウム (ISIS-7), シーサイドホテル舞子ビラ, 2011.10.9-10 (垣内喜代三, 組織委員).
- (3) International Symposium on Green Photonics for Efficient Photon-Harvesting Materials and Reactions (ISGP2012), 奈良先端科学技術大学院大学, 2012.11.16 (垣内喜代三, 共同組織委員長).
- (4) Twelfth International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-12), 京都リーガロイヤルホテル, 2012.11.12-16 (垣内喜代三, 組織委員).
- (5) The 9th Korea-Japan Symposium on Frontier Photoscience - 2013, ソウル国立大学, 韓国, 2013.11.24-27 (垣内喜代三, 組織委員).
- (10) 第 8 回集積有機合成国際シンポジウム (ISIS-8), 東大寺総合文化センター, 2013.11.29-12.1 (垣内喜代三, 組織委員).

5. 受賞等

- (1) 西山靖浩 (特任助教)

Best Presentation Award in Young Scientist Session 2011 Korea-Japan Symposium on Frontier Photoscience (2011 KJFP), 2011.11.1

- (2) 張 有来 (平成 23 年度修了生)

学生講演賞、第 92 回日本化学会春季年会、2012.4.23

- (3) 寺尾 公維 (博士 2 年)

第 33 回光化学若手の会講演賞、第 33 回光化学若手の会、2012.6.23

- (4) 若間 範充 (博士 3 年)

Best Award International Conference on BioSensors, BioElectronics, BioMedical Devices, BioMEMS/NEMS and Applications 2013 (Bio4Apps 2013), 2013.10.30

6. 新聞報道等

なし

7. 国民との科学・技術対話

- (1) 平成23年度公開業績報告会（修士2年生会田森君が「反応集積化による高効率な光付加反応の検討」、修士2年生松岡均君が「偏光分析 CMOS センサによるマイクロリアクタ統合型 in situ 不斉計測システムに関する研究」でポスター展示）
対象者：一般および大学生、127名（性別不明）、平成24年3月10日（土）
10:00～17:00、アンケートなし
- (2) 奈良先端科学技術大学院大学、公開講座2012「ソフトマターが拓く未来の暮らし」（8人8回のうち1回担当）にて「光反応を用いた複雑な有機分子の創り方」を講演、対象：一般市民、出席人数：240名、2012.10.6、アンケート有

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：大阪府立大学，柳研究室（A01班，計画班員）
派遣人員（派遣）：寺尾公維（修士2年），西山靖浩（博士研究員）
派遣期間（派遣）：2010.6.15
共同研究内容：フローマイクロリアクターシステムを用いた光反応
共同研究成果：国際学会発表、論文発表