

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) Phase-Transfer-Catalyzed Asymmetric α -Arylation of α -Amino Acid Derivatives
Shirakawa, S.; Yamamoto, K.; Tokuda, T.; Maruoka, K.* *Asian J. Org. Chem.* **2014**, *3*, Early View. (DOI: 10.1002/ajoc.201400004)
- (2) Kinetic Resolution of Axially Chiral 2-Amino-1,1'-Biaryls by Phase-Transfer-Catalyzed N-Allylation
Shirakawa, S.; Wu, X.; Maruoka, K.* *Angew. Chem. Int. Ed.* **2013**, *52*, 14200–14203. (DOI: 10.1002/anie.201308237)
- (3) Phase-Transfer-Catalyzed Asymmetric Synthesis of Axially Chiral Anilides
Liu, K.; Wu, X.; Kan, S. B. J.; Shirakawa, S.; Maruoka, K.* *Chem. Asian J.* **2013**, *8*, 3214–3221. (DOI: 10.1002/asia.201301036)
- (4) Design of Chiral Bifunctional Quaternary Phosphonium Bromide Catalysts Possessing an Amide Moiety
Shirakawa, S.; Tokuda, T.; Kasai, A.; Maruoka, K.* *Org. Lett.* **2013**, *15*, 3350–3353. (DOI: 10.1021/ol4013926)
- (5) Hexameric Capsule of a Resorcinarene Bearing Fluorous Feet as a Self-Assembled Nanoreactor: A Diels–Alder Reaction in a Fluorous Biphasic System
Shimizu, S.*; Usui, A.; Sugai, M.; Suematsu, Y.; Shirakawa, S.; Ichikawa, H. *Eur. J. Org. Chem.* **2013**, 4734–4737. (DOI: 10.1002/ejoc.201300652)
- (6) Chiral Onium Salts
Shirakawa, S.; Maruoka, K. In *Comprehensive Enantioselective Organocatalysis*; Dalko, P. I. ed.; Wiley-VCH: Weinheim, Germany, 2013; Chapter 14, pp 365–380.
- (7) 中性条件下での相間移動反応
白川誠司, *化学と工業*, **2013**, *66* (9), 735–736.
- (8) Chiral Organotin Hydride Catalyzed Enantioselective Radical Cyclization of Aldehydes
Shirakawa, S.; Usui, A.; Kan, S. B. J.; Maruoka, K.* *Asian J. Org. Chem.* **2013**, *2*, 916–919. (DOI: 10.1002/ajoc.201300138)
- (9) Recent Developments in Asymmetric Phase-Transfer Reactions
Shirakawa, S.; Maruoka, K.* *Angew. Chem. Int. Ed.* **2013**, *52*, 4312–4348. (DOI: 10.1002/anie.201206835)
- (10) Efficient Approach for the Design of Effective Chiral Quaternary Phosphonium Salts in Asymmetric Conjugate Additions

- Shirakawa, S.; Kasai, A.; Tokuda, T.; Maruoka, K.* *Chem. Sci.* **2013**, *4*, 2248–2252. (DOI: 10.1039/c3sc22130j)
- (11) Phase-Transfer-Catalyzed Asymmetric Conjugate Cyanation of Alkylidenemalonates with KCN in the Presence of a Brønsted Acid Additive
Liu, Y.; Shirakawa, S.; Maruoka, K.* *Org. Lett.* **2013**, *15*, 1230–1233. (DOI: 10.1021/ol400143m)
- (12) Enantioselective Alkylation of *N*-(Diphenylmethylene)glycinate *tert*-Butyl Ester: Synthesis of (*R*)-2-(Benzhydrylidenamino)-3-Phenylpropanoic Acid *tert*-Butyl Ester
Shirakawa, S.; Yamamoto, K.; Liu, K.; Maruoka, K. *Org. Synth.* **2013**, *90*, 112–120.
- (13) Enantioselective Alkylation of 2-[(4-Chlorobenzylidene)Amino]Propanoic Acid *tert*-Butyl Ester: Synthesis of (*R*)-2-Amino-2-Methyl-3-Phenylpropanoic Acid *tert*-Butyl Ester
Shirakawa, S.; Yamamoto, K.; Liu, K.; Maruoka, K. *Org. Synth.* **2013**, *90*, 121–129.
- (14) New Neutral Reaction System with Crown Ether–KCl Complexes in Aqueous Solution
Shirakawa, S.; Wang, L.; Kasai, A.; Maruoka, K.* *Chem. Eur. J.* **2012**, *18*, 8588–8590. (DOI: 10.1002/chem.201201107)
- (15) Catalytic Asymmetric Synthesis of 3-Substituted Proline Derivatives by Using Phase-Transfer-Catalyzed Conjugate Addition
Liu, Y.; Usui, A.; Shirakawa, S.; Maruoka, K.* *Asian J. Org. Chem.* **2012**, *1*, 180–186. (DOI: 10.1002/ajoc.201200039)
- (16) New Chiral Phase-Transfer Catalysts Possessing a 6,6'-Bridged Ring on the Biphenyl Unit: Application to the Synthesis of α,α -Dialkyl- α -amino Acids
Kubota, Y.; Shirakawa, S.; Inoue, T.; Maruoka, K.* *Tetrahedron Lett.* **2012**, *53*, 3739–3741. (DOI: 10.1016/j.tetlet.2012.04.127)
- (17) Asymmetric Phase-Transfer Catalysis
Shirakawa, S.; Maruoka, K. In *Modern Tools for the Synthesis of Complex Bioactive Molecules*; Cossy, J. Arseniyadis, S. eds.; John Wiley & Sons: Hoboken, New Jersey, 2012; Chapter 7, pp 213–242.
- (18) Efficient Asymmetric Synthesis of a Bicyclic Amino Acid as a Core Structure of Telaprevir
Shirakawa, S.; Liu, Y.; Usui, A.; Maruoka, K.* *ChemCatChem* **2012**, *4*, 980–982. (DOI: 10.1002/cctc.201200081)
- (19) The Direct Catalytic Asymmetric Aldol Reaction of α -Substituted Nitroacetates with Aqueous Formaldehyde under Base-Free Neutral Phase-Transfer Conditions
Shirakawa, S.; Ota, K.; Terao, S. J.; Maruoka, K.* *Org. Biomol. Chem.* **2012**, *10*, 5753–5755. (DOI: 10.1039/C2OB07193B)

- (20) Catalytic Asymmetric Synthesis of Axially Chiral *o*-Iodoanilides by Phase-Transfer Catalyzed Alkylations
Shirakawa, S.; Liu, K.; Maruoka, K.* *J. Am. Chem. Soc.* **2012**, *134*, 916–919. (DOI: 10.1021/ja211069f)
- (21) Asymmetric Neutral Amination of Nitroolefins Catalyzed by Chiral Bifunctional Ammonium Salt in Water-Rich Solvent
Wang, L.; Shirakawa, S.; Maruoka, K.* *Angew. Chem. Int. Ed.* **2011**, *50*, 5327–5330. (DOI: 10.1002/anie.201101307)
- (22) Diastereo- and Enantioselective Conjugate Addition of α -Substituted Nitroacetates to Maleimides under Base-Free Neutral Phase-Transfer Conditions
Shirakawa, S.; Terao, S. J.; He, R.; Maruoka, K.* *Chem. Commun.* **2011**, *47*, 10557–10559. (DOI: 10.1039/c1cc14043d)
- (23) Phase-Transfer Catalyzed Asymmetric Synthesis of 1,1-Disubstituted Tetrahydroisoquinolines
Shirakawa, S.; Liu, K.; Ito, H.; Le, T. N.; Maruoka, K.* *Adv. Synth. Catal.* **2011**, *353*, 2614–2618. (DOI: 10.1002/adsc.201100269)
- (24) Phase-Transfer Catalysis: Non-Natural-Product-Derived PTC
Shirakawa, S.; Maruoka, K. In *Science of Synthesis: Asymmetric Organocatalysis 2*; Maruoka, K. ed.; Georg Thieme Verlag KG: Stuttgart·New York, 2012; Chapter 2.3.2, pp 551–599.
- (25) Asymmetric α -Functionalization of Carbonyl Compounds and Alkylation of Enolates
Shirakawa, S.; Maruoka, K. In *Science of Synthesis: Water in Organic Synthesis*; Kobayashi, S. ed.; Georg Thieme Verlag KG: Stuttgart·New York, 2012; Chapter 5.6, pp 601–615.
- (26) 中性条件下で進む不斉相間移動反応 –生体内反応系により近い反応系を実現!!–
白川誠司, 丸岡啓二, *化学*, **2012**, *67* (2), 18–22.
- (27) Catalytic Asymmetric Synthesis of 1,1-Disubstituted Tetrahydro- β -carbolines by Phase-Transfer Catalyzed Alkylations
Shirakawa, S.; Liu, K.; Ito, H.; Maruoka, K.* *Chem. Commun.* **2011**, *47*, 1515–1517. (DOI: 10.1039/c0cc04447d)
- (28) Chiral Bifunctional Phase Transfer Catalysts for Asymmetric Fluorination of β -Keto Esters
Wang, X.; Lan, Q.; Shirakawa, S.; Maruoka, K.* *Chem. Commun.* **2010**, *46*, 321–323. (DOI: 10.1039/b920099a)

(29) Phase-Transfer-Catalyzed Asymmetric Conjugate Additions of β -Ketoesters to Acetylenic Ketones

Lan, Q.; Wang, X.; Shirakawa, S.; Maruoka, K.* *Org. Process Res. Dev.* **2010**, *14*, 684–686. (DOI: 10.1021/op100014v)

(30) Asymmetric Phase-Transfer and Ion Pair Catalysis

Shirakawa, S.; Maruoka, K. In *Catalytic Asymmetric Synthesis, 3rd ed*; Ojima, I. ed.; John Wiley & Sons: Hoboken, New Jersey, 2010; Chapter 2C, pp 95–117.

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) キラル相間移動触媒による軸不斉化合物の触媒的不斉合成

白川誠司, 日本化学会第94春季年会, 特別企画『進化する有機分子触媒』、名古屋大学東山キャンパス, 愛知, 2014.3.27–3.30 (招待講演).

(2) Phase-Transfer Catalyzed Asymmetric Synthesis of Axially Chiral Anilides

Shirakawa, S.; Liu, K.; Maruoka, K. The 8th International Symposium on Intergrated Synthesis (ISIS-8), Todaiji Temple Cultural Center, Nara, Japan, 2013.11.29–12.1 (ポスター発表).

(3) Design of Chiral Bifunctional Quaternary Phosphonium Bromide Catalysts Possessing Amide Moiety

Tokuda, T.; Kasai, A.; Shirakawa, S.; Maruoka, K. The 8th International Symposium on Intergrated Synthesis (ISIS-8), Todaiji Temple Cultural Center, Nara, Japan, 2013.11.29–12.1 (ポスター発表).

(4) Phase-Transfer Catalyzed Asymmetric Synthesis of Axially Chiral Anilides

Shirakawa, S. 48th EUCHEM Conference on Stereochemistry “Bürgenstock Conference”, Seehotel Waldstätterhof, Brunne, Switzerland, 2013.4.28–5.3 (口頭発表).

(5) Catalytic Asymmetric Synthesis of Axially Chiral Anilides by Phase-Transfer Catalyzed Alkylations

Shirakawa, S.; Liu, K.; Maruoka, K. The 12th Tateshina Conference on Organic Chemistry, Tateshina Form, Nagano, Japan, 2012.11.9–11.11 (ポスター発表).

(6) 不斉相間移動反応の新展開 -塩基を用いない中性条件下での環境調和型反応系の開発-

白川誠司, 日本化学会第 93 春季年会 若い世代の特別講演会, 立命館大学びわこ・くさつキャンパス, 滋賀, 2013.3.22–3.25 (招待講演).

(7) Base-Free Neutral Phase-Transfer Reaction System

Shirakawa, S. Second International Collaborative and Cooperative Chemistry Symposium, The University of Queensland, Queensland, Australia, 2011.10.31–11.2 (招待講演).

- (8) キラル相間移動触媒反応の新展開 –塩基を用いない中性条件下での環境調和型キラル相間移動触媒反応–
白川誠司, 社団法人 新化学技術推進協会 先端化学・材料技術部会 講演会, 新化学技術推進協会会議室, 東京, 2011.6.30 (招待講演).
- (9) Phase-Transfer Catalyzed Asymmetric Synthesis of 1,1-Disubstituted Tetrahydro- β -carbolines and Tetrahydroisoquinolines
Shirakawa, S.; Liu, K.; Ito, H.; Le, T. N.; Maruoka, K. The 7th International Symposium on Intergrated Synthesis (ISIS-7), Maiko Villa Kobe, Kobe, Japan, 2011.10.9–10 (ポスター発表).
- (10) Phase-Transfer Catalyzed Diastereo- and Enantioselective Conjugate Additions of α -Substituted Nitroacetates to Maleimides under Neutral Conditions
Terao, S. J.; Shirakawa, S.; Maruoka, K. The 2nd International Symposium on Process Chemistry (ISPC 2011), Kyoto International Conference Center, Kyoto, Japan, 2011.8.10–12 (ポスター発表).
- (11) Asymmetric Phase-Transfer-Catalyzed Construction of Quaternary Carbon Center in Chiral Cyclic Amines
Liu, K.; Ito, H.; Shirakawa, S.; Maruoka, K. 5th *ChemComm* International Symposium, Kyoto University, Kyoto, Japan, 2011.5.16 (ポスター発表).
- (12) Phase-Transfer Catalyzed Diastereo- and Enantioselective Conjugate Additions of α -Substituted Nitroacetates to Maleimides under Neutral Conditions
Terao, S. J.; Shirakawa, S.; Maruoka, K. 5th *ChemComm* International Symposium, Kyoto University, Kyoto, Japan, 2011.5.16 (ポスター発表).
- (13) Asymmetric Neutral Amination of Nitroolefins Catalyzed by Chiral Bifunctional Ammonium Salt in Water-Rich Solvent
Wang, L.; Shirakawa, S.; Maruoka, K. 5th *ChemComm* International Symposium, Kyoto University, Kyoto, Japan, 2011.5.16 (ポスター発表).
- (14) Development of a Base-Free Chiral Phase-Transfer Reaction System
Shirakawa, S.; Wang, L.; He, R.; Maruoka, 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).
- (15) Practical Enantioselective Synthesis of Optically Active 1,1-Disubstituted Tetrahydro- β -carbolines by Phase-Transfer-Catalyzed Alkylation
Liu, K.; Shirakawa, S.; Maruoka, 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).

(16) Phase-Transfer Catalyzed Enantioselective Conjugate Additions of α -Nitro Esters to Maleimides under Neutral Conditions

Terao, S. J.; Shirakawa, S.; Maruoka, K. The 6th International Symposium on Intergrated Synthesis (ISIS-6), Maiko Villa Kobe, Kobe, Japan , 2010.10.23–24 (ポスター発表).

(17) Development of a Base-Free Chiral Phase-Transfer Reaction System

Shirakawa, S.; Wang, L.; He, R.; Maruoka, K. The 6th International Symposium on Intergrated Synthesis (ISIS-6), Maiko Villa Kobe, Kobe, Japan , 2010.10.23–24 (ポスター発表).

3. 特許

4. 学会・シンポジウム等の開催状況

(1) Fifth Asian Symposium on Advanced Organic Synthesis, 京都大学, 2010.11.11 (白川誠司, Organizing Committee).

5. 受賞等

(1) 白川誠司 (A01 班, 公募班員)

2013 年度 有機合成化学協会 有機合成化学奨励賞、2014.2.20.

(2) 白川誠司 (A01 班, 公募班員)

平成 25 年度 文部科学大臣表彰 若手科学者賞、2013.4.16.

(3) 白川誠司 (A01 班, 公募班員)

日本化学会第 27 回若い世代の特別講演会 特別講演証、2013.3.23.

(4) 劉昆 [博士課程 3 年 (A01 班, 公募班員, 白川誠司, 共同研究者)]

学生講演賞(2K6-09) 第 92 回日本化学会年会、2012.4.12.

(5) Lijia Wang [博士研究員 (A01 班, 公募班員, 白川誠司, 共同研究者)]

Best Poster Award in 5th *ChemComm* International Symposium, 2011.5.16.

(6) 白川誠司 (A01 班, 公募班員)

優秀講演賞 第 90 回日本化学会年会、2010.4.14

6. 新聞報道等

(1) Selected by the Editorial Board of *Synfacts* (*Synfacts* 2013, 553.)

Phase-Transfer-Catalyzed Asymmetric Conjugate Cyanation of Alkylidenemalonates with KCN in the Presence of a Brønsted Acid Additive. Liu, Y.; Shirakawa, S.; Maruoka, K. *Org. Lett.* **2013**, *15*, 1230–1233.

(2) Selected by the Editorial Board of *Synfacts* (*Synfacts* 2011, 791.)

Asymmetric Neutral Amination of Nitroolefins Catalyzed by Chiral Bifunctional Ammonium Salt in Water-Rich Solvent. Wang, L.; Shirakawa, S.; Maruoka, K. *Angew. Chem. Int. Ed.* **2011**, *50*, 5327–5330.

(3) Selected as a Hot Paper in *Angew. Chem.*

Asymmetric Neutral Amination of Nitroolefins Catalyzed by Chiral Bifunctional Ammonium Salt in Water-Rich Solvent. Wang, L.; Shirakawa, S.; Maruoka, K. *Angew. Chem. Int. Ed.* **2011**, *50*, 5327–5330.

(4) Selected by the Editorial Board of *Synfacts* (*Synfacts* 2011, 210.)

Catalytic Asymmetric Synthesis of 1,1-Disubstituted Tetrahydro- β -carbolines by Phase-Transfer Catalyzed Alkylations. Shirakawa, S.; Liu, K.; Ito, H.; Maruoka, K. *Chem. Commun.* **2011**, *47*, 1515–1517.

7. 国民との科学・技術対話

(1) JSPS サイエンス・ダイアログとして共同研究者である S. B. Jennifer Kan 博士(JSPS 外国人特別研究員)と共に愛知県立時習館高等学校を訪問し、高校生(約 30 名)に有機化学の講義を行うとともに、交流をはかった。2013.10.19.

(2) JSPS サイエンス・ダイアログとして共同研究者である S. B. Jennifer Kan 博士(JSPS 外国人特別研究員)と共に福井県立若狭高等学校を訪問し、高校生(約 50 名)に有機化学の講義を行うとともに、交流をはかった。2013.1.23.

8. 領域内の共同研究の準備・実施状況とその成果