

## 研究期間全年度 研究業績

勝村成雄 (大阪市立大学複合先端研究機構、A02 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) New Strategy in Synthetic Biology: from Enzyme Inhibition and Natural Products Synthesis to PET Imaging by  $6\pi$ -Azaelectrocyclization  
Tanaka, K.; Fukase, K.; Katsumura, S.\* *The Chemical Record*, **2010**, *10*, 119-139.  
(10.1002/tcr.200900026)
- (2) Syntheses of Ylidenbutenolide-modified Derivatives of Peridinin and Their Stereochemical and Spectral Characteristics  
Kajikawa, T.; Aoki, K.; Iwashita, T.; Niedzwiedzki, D. M.; Frank, H. A.; Katsumura, S.\*  
*Org. Biomol. Chem.* **2010**, *8*, 2513-2516.  
(10.1039/c002006k)
- (3) Triplet State Spectra and Dynamics of Peridinin Analogs Having Different Extents of  $\pi$ -Electron Conjugation  
Kaligotla, S.; Doyle, S.; Niedzwiedzki, D. M.; Hasegawa, S.; Kajikawa, T.; Katsumura, S.\*; Frank, H. A. *Photosynth. Res.* **2010**, *103*, 167-174.  
(10.1007/s11120-010-9535-y)
- (4) An Approach Based on Organic Synthesis toward Elucidating the Mechanism of Super Energy Transfer Efficiencies of Peridinin in Photosynthesis  
Kajikawa, T.; Furuichi, N.; Katsumura, S.\* *J. Synth. Org. Chem. Japan*, **2010**, *68*, 625-637.
- (5) Stark Absorption Spectroscopy of Peridinin and Allene-modified Analogues  
Kusumoto, T.; Horibe, T.; Kajikawa, T.; Hasegawa, S.; Iwashita, T.; Cogdell, R. J.; Birge, R. R.; Frank, H. A.; Katsumura, S.\*; Hashimoto, H. *Chem. Phys.* **2010**, *373*, 71-79.  
(org/10.1016/j.chemphys.2010.01018)
- (6) N- and O-methylation of Sphingomyelin Markedly Affects Its Membrane Properties and Interactions with Cholesterol  
Björkbom, A.; Ró, T.; Kankaanpää, P.; Lindroos, D.; Kaszuba, K.; Kurita, M.; Yamaguchi, S.; Yamamoto, T.; Jaikishan, S.; Paavolainen, L.; Päivärinne, J.; Nyholm, T. K. M.; Katsumura, S.\*; Vattulainen, I.; Slotte, J. P. *Biochim. Biophys. Acta*, **2011**, *1808*, 1179-1186.  
(10.1016/j.bbamem.2011.01.009)
- (7) N-cholesteryl Sphingomyelin - A Synthetic Sphingolipid with Unique Membrane Properties

- Sergelius, C.; Yamaguchi, S.; Yamamoto, T.; Slotte, J. P.; Katsumura, S.\* *Biochim. Biophys. Acta*, **2011**, *1808*, 1054-1062.  
(10.1016/j.bbamem.2010.12.021)
- (8) Effects of Sphingosine 2*N*- and 3*O*-methylation on Palmitoyl Ceramide Properties in Bilayer Membranes  
Maula, T.; Yamaguchi, S.; Kurita, M., Yamamoto, T.; Katsumura, S.\*; Slotte, J. P. *Biophys J.* **2011**, *101*, 2948-2956.  
(10.1016/j.bpj.2011.11.007)
- (9) Exploring a Unique Reactivity of 6*p*-Azaelectrocyclization to Emzyme Inhibition, Natural Products Synthesis, and Molecular Imaging: An Approach to Chemical Biology by Synthetic Chemists  
Tanaka, K.; Fukase, K.; Katsumura S.\* *SYNLETT*, **2011**, 2115-2139.  
(10.1055/s-0030-1261192)
- (10) Effect of Sphingomyelin Head Group Size on Molecular Properties and Interactions with Cholesterol  
Björkbom, A.; Róg, T.; Kaszuba, K.; Kurita, M.; Yamaguchi, S.; Lönnfors, T. K. M.; Nyholm, T. K.M; Vattulainen, I.; Katsumura, S.\*; Slotte, J. P. *Biophys. J.* **2011**, *99*, 3300-3308.  
(10.1016/j.bpj.2010.09.049)
- (11) Total Synthesis of (-)-20-Epiuleine via Stereocontrolled One-pot Asymmetric Azaelectrocyclization Followed by Novel 1, 4-Addition reaction  
Sakaguchi, T.; Kobayashi, S.; Katsumura, S.\* *Org. Biomol. Chem.* **2011**, *9*, 257-264.  
(10.1039/c0ob00627k)
- (12) Singlet and Triplet State Spectra and Dynamics of Structurally-modified Peridinins  
Fuciman, M.; Enriquez, M.; Kaligotla, S.; Niedzwiedzki, D.; Kajikawa, T.; Aoki, K.; Katsumura, S.\*; Frank, H. A. *J. Phys. Chem.* **2011**, *115*, 4436-4445.  
(org/10.1021/jp110092c)
- (13) [1,5]-H Shift of Aldehyde Hydrogen in Dienal Compounds to Produce Ketenes  
Sakaguchi, T; Okuno, Y.; Tsutsumi, Y.; Thuchikawa, H.; Katsumura, S.\* *Org. Lett.* **2011**, *13*, 4292-4295.  
(10.1021/ol2016302)
- (14) Structure-activity Relationship of Sphingomyelin Analogs with Sphingomyelinase from *Bacillus Cereus*  
Niinevehmas, C. S.; Maula, T.; Kurita, M.; Yamaguchi, S.; Yamamoto, T.; Katsumura, S.\*; Slotte, J. P. *Biochim. Biophys. Acta*, **2012**, *1818*, 474-480.

- (10.1016/j.bbamem.2011.10.013)
- (15) New Type of Azacyclization: Thermal Preparation of 4,6-Disubstituted 2-Piperidinone from N-sulfonyldienamide and its Substituted Effect  
Maekawa, Y.; Sakaguchi, T.; Tsuchikawa, H.; Katsumura, S.\* *Tetrahedron Lett.* **2012**, *53*, 837-841.  
(10.1016/j.tetlet.2011.12.014)
- (16) Stereocontrolled Total Synthesis of Fucoxanthin and its Polyene Chain-modified Derivative  
Kajikawa, T.; Okumura, S.; Iwashita, T.; Kosumi, D.; Hashimoto, H.; Katsumura, S.\* *Org. Lett.* **2012**, *14*, 808-811.  
(10.1021/ol203344c)
- (17) Stereocontrolled Synthesis of Substituted Chiral Piperidines via One-Pot Asymmetric  $6\pi$ -Azoelectrocyclization: Asymmetric Syntheses of (-)-Dendroprimine, (+)-7-Epidendroprimine, (+)-5-Epidendroprimine, and (+)-5,7-Epidendroprimine  
Kobayashi, T.; Hasegawa, F.; Hirose, Y.; Tanaka, K.; Mori, H.; Katsumura, S.\* *J. Org. Chem.* **2012**, *77*, 1812-1832.  
(org/10.1021/jo202350z)
- (18) Palladium-catalyzed Asymmetric 6-Endo Cyclization of Dienamides with Substituents-driven Activation  
Tsuchikawa, H.; Maekawa, Y.; Katsumura, S.\* *Org. Lett.* **2012**, *14*, 2326-2329.  
(10.1021/ol300737t)
- (19) Effect of Molecular Symmetry on the Spectra and Dynamics of the Intramolecular Charge Transfer (ICT) State of Peridinin  
Enriquez, M. M.; Hananoki, S.; Hasegawa, S.; Kajikawa, T.; Katsumura, S.\*; Wagner, N. L.; Birge, R. R.; Frank, H. A. *J. Phys. Chem. B*, **2012**, *116*, 10748-10756.  
(org/10.1021/jp305804q)
- (20) Cholesterol's Interactions with Serine Phospholipids - a Comparison of N-palmitoyl Ceramide Phosphoserine with Dipalmitoyl Phosphatidylserine  
Sergelius, C.; Yamaguchi, S.; Yamamoto, T.; Engberg, O.; Katsumura, S.\*; Slotte, J. P. *Biochim. Biophys. Acta*, **2013**, *1828*, 785-791.  
(org/10.1016/j.bbamem.2012.11.009)
- (21) Effects of Sphingomyelin Headgroup Size on Interactions with Ceramide  
Artetxe, I.; Sergelius, C.; Kurita, M.; Yamaguchi, S.; Katsumura, S.\*; Slotte, J. P.; Maula, T. *Biophys. J.* **2013**, *104*, 604-612.  
(org/10.1016/j.bpj.2012.12.026)

- (22) 2NH and 3OH are Crucial Structural Requirements in Sphingomyelin for Sticholysin II Binding and Pore Formation in Bilayer Membranes  
Maula T.; Isaksson Y. J. E.; García-Linares, S.; Niinivehmas, S.; Pentikäinen, O. T.; Kurita, M.; Yamaguchi, S.; Yamamoto, T.; Katsumura, S.\*; Gavilanes, J. G.; Martínez-del-Pozo, Á.; Slotte, J. P. *Biochim. Biophys. Acta*, **2013**, 1828, 1390-1395.  
(org/10.1016/j.bbamem.2013.01.018)
- (23) One-pot Asymmetric 6p-Azaelectrocyclization as a New Strategy for Alkaloid Synthesis  
Kobayashi, T.; Sakaguchi, T.; Katsumura, S.\* *Heterocycles*, **2013**, 87, 729-761.  
(10.3987/REV-12-761)
- (24) Excited States Energies and Dynamics of Peridinin Analogues and the Nature of the Intramolecular Charge Transfer (ICT) State in Carbonyl-Containing Carotenoids  
Dariusz, N.; Kajikawa, T.; Aoki, K.; Katsumura, S.\*; Frank, H. A. *J. Phys. Chem. B*, **2013**, 117, 6874-6887.  
(org/10.1021/jp400038k)
- (25) Total Synthesis of (-)-Hippodamine by Stereocontrolled Construction of Azaphenalene Skeleton Based on Extended One-pot Asymmetric Azaelectrocyclization  
Fujita, S.; Sakaguchi, T.; Kobayashi, T.; Tsuchikawa, H.; Katsumura, S.\* *Org. Lett.* **2013**, 15, 2758-2761.  
(10.1021/ol4010917)
- (26) Straightforward Synthesis of Fucoxanthin Short-chain Derivatives via Modified-Julia Olefination  
Okumura, S.; Kajikawa, T.; Yano, K.; Sakaguchi, K.; Kosumi, D.; Hashimoto, H.; Katsumura, S.\* *Tetrahedron Lett.* **2014**, 55, 407-410.  
(org/10.1016/j.tetlet.2013.11.043)
- (27) Excited State Properties of a Short  $\pi$ -Electron Conjugated Peridinin Analogue  
Magdaong, N. M.; Niedzwiedzki, D. M.; Greco, J. A.; Liu, H.; Yano, K.; Kajikawa, T.; Sakaguchi, K.; Katsumura, S.\*; Birge R. R.; Frank, H. A. *Chem. Phys. Lett.* **2014**, 593, 132-139.  
(org/10.1016/j.cplett.2014.01.002)
- (28) Elucidation and Control of an Intramolecular Charge Transfer Property of Fucoxanthin by a Modification of Its Polyene Chain Length  
Magdaong, N. M.; Niedzwiedzki, D. M.; Greco, J. A.; Liu, H.; Yano, K.; Kajikawa, T.; Kosumi, D.; Kajikawa, T.; Okumura, S.; Sugisaki, M.; Sakaguchi, K.; Katsumura, S.\*; Hashimoto, H. *J. Phys. Chem. Lett.* in press, **2014**.

## その他、著書

An Approach Based on Synthetic Organic Chemistry Toward Elucidation of Highly Efficient Energy Transfer Ability of Peridinin in Photosynthesis

Takayuki Kajikawa; Shigeo Katsumura. In *ARTIFICIAL PHOTOSYNTHESIS*; Mohammad Mahdi Najafpour., Eds.; In Tech: Croatia, 2012; Part 2, Chapter 7, pp135-152.

## 和文雑誌

海洋性カロテノイドの効率的なエネルギー伝達のしくみを分子レベルで解き明かす

梶川敬之, 勝村成雄\*, 化学と生物, 2011, 49 (4), 281-286.

## 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) One-pot Asymmetric 6p-Azaelectrocyclization as a Strategy for Alkaloid Synthesis (1);  
Total Syntheses of (-)-Dendroprimine, (-)-Hippodamine  
Katsumura, S.; Kobayashi, T.; Fujita, S. The 18<sup>th</sup> International Conference on Organic Synthesis (ICOS-18), Grieghallen Culture & Convention Centre, Bergen, Norway, 2010.8.1-6 ( ポスター発表 ) .
- (2) One-pot Asymmetric 6p-Azaelectrocyclization as a Strategy for Alkaloid Synthesis (2);  
Syntheses of Indole Alkaloids  
Sakaguchi, T.; Kobayashi, T.; Li, Y.; Kitamura, T.; Kobayashi, S.; Katsumura, S. The 18<sup>th</sup> International Conference on Organic Synthesis (ICOS-18), Grieghallen Culture & Convention Centre, Bergen, Norway, 2010.8.1-6 ( ポスター発表 ) .
- (3) Syntheses of Peridinin Analogues Toward Elucidation of its Highly Efficient Energy Transfer Mechanism in Photosynthesis  
Kajikawa, T.; Hasegawa, S.; Iwashita, T.; Kusumoto, T.; Niedzwiedzki, D. M.; Hashimoto, H.; Frank, H. A.; Katsumura, S. The 18<sup>th</sup> International Conference on Organic Synthesis (ICOS-18), Grieghallen Culture & Convention Centre, Bergen, Norway, 2010.8.1-6 ( ポスター発表 ) .
- (4) One-pot Asymmetric Azaelectrocyclization as a Strategy for Alkaloid Synthesis  
Katsumura, S. Åbo Akademi University, Finland, 2010.5.28. ( 招待講演 ) .
- (5) Synthesis of Sphingomyelin Analogues toward Elucidation of Membrane Raft Properties  
Katsumura, S. Aalto University, Helsinki, 2010.5.31. ( 招待講演 ) .
- (6) New type of Azacyclization :Preperation of 4,6-Disubstituted 2-Piperidinone from N-Sulfonyldienamide

- Okuno, Y.; Maekawa, Y.; Sakaguchi, T.; Tsuchikawa, H.; Katsumura, S. The 19<sup>th</sup> International Conference on Organic Synthesis (ICOS-19), Melbourne, Australia, 2012.7.1-6 (ポスター発表).
- (7) Energy Transfer Mechanism of Polyfunctional Carotenoids in Marine Photosynthesis based on Organic Synthesis  
Yano, K.; Kajikawa, T.; Iwashita, T.; Kusumoto, T.; Niedzwiedzki, D. M.; Hashimoto, H.; Frank, H. A.; Katsumura, S. The 19<sup>th</sup> International Conference on Organic Synthesis (ICOS-19), Melbourne, Australia, 2012.7.1-6 (ポスター発表).
- (8) [1,5]-H Shift of Aldehyde Hydrogen in Dienal Compounds to Produce Ketenes and It's Substituent Effect  
Sakaguchi, T.; Shigenobu, M.; Tsutsumi, Y.; Okuno, Y.; Tsuchikawa, H.; Katsumura, S. The 19<sup>th</sup> International Conference on Organic Synthesis (ICOS-19), Melbourne, Australia, 2012.7.1-6 (ポスター発表).
- (9) Smooth [1,5]-H Shift of Aldehyde Hydrogens due to Remarkable Substituent Effect  
Sakaguchi, T.; Okuno, Y.; Tsutsumi, Y.; Tsuchikawa, H.; Katsumura, S. The 12nd International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-12), Kyoto, Japan, 2012.11.13 (ポスター発表).
- (10) Synthesis of Peridinin Derivatives toward Elucidating the Mechanism of Super Energy Transfer Efficiencies of Peridinin in Photosynthesis  
Yano, K.; Kajikawa, T.; Hananoki, S.; Iwashita, T.; Frank, H. A.; Hashimoto, H.; Katsumura, S. The 12nd International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-12), Kyoto, Japan, 2012.11.14 (ポスター発表).
- (11) Synthesis of Sphingomyelin Analogs toward Elucidation of Membrane Raft Properties  
Katsumura, S.; Yamamoto, T.; Yamaguchi, S.; Kurita, M.; Sakaguchi, T.; Björkbom, A.; Sergelius, C.; Slotte, J. P. The 12nd International Kyoto Conference on New Aspects of Organic Chemistry (IKCOC-12), Kyoto, Japan, 2012.11.15 (ポスター発表).
- (12) 機能性天然物の新局面を拓く有機合成のパワー  
勝村成雄、第32回有機合成若手セミナー、神戸 2012年11月22日(招待講演)
- (13) 仲間と追いかけた機能性天然物合成のおもしろさ  
勝村成雄、有機合成新春講演会、大阪 2013年1月23日(招待講演)
- (14) Synthesis of Sphingolipid Derivatives as Effective Tool Molecules  
勝村成雄、タンパク質情報交換会、大阪大学理学部、大阪 2013年5月16日(招待講演)
- (15) 天然物合成の魔力に40年  
勝村成雄、理研シンポジウム、大阪大学会館講堂、大阪 2013年5月31日(招待講演)

(16) 機能性天然物合成とカップリング反応

勝村成雄、近畿化学協会有機金属部会 平成25年度第2回例会、早稲田大学西早稲田キャンパス、東京 2013年6月18日(招待講演)

(17) 天然物合成の魔力に40年

勝村成雄、関西創農薬研究会、住友化学宝塚 健康・農薬研究所、兵庫 2013年9月20日(招待講演)

(18) One-pot Asymmetric Azaelectrocyclization as Strategy for Alkaloid Synthesis: Total synthesis of Protoemetine

Okuno, Y.; Takeuchi, Y.; Kobayashi, S.; Sakaguchi, T.; Tsuchikawa, H.; Katsumura, S. The Eighth International Symposium on Integrated Synthesis (ISIS-8), Todaiji Temple Cultural Center, Nara, Japan, 2013.11.29 (ポスター発表).

(19) Polyfunctional Carotenoid Synthesis via One-pot Strategy: Toward Elucidation of Energy Transfer Process in Marine Photosynthesis

Kajikawa, T.; Yano, K.; Hananoki, S.; Hasegawa, S.; Sakaguchi, K.; Shinada, T.; Katsumura, S. The Eighth International Symposium on Integrated Synthesis (ISIS-8), Todaiji Temple Cultural Center, Nara, Japan, 2013.11.29 (ポスター発表).

(20) 天然物合成の魔力に40年:機能解明に向けた有機合成からのアプローチ

勝村成雄、平成25年度 徳島文理大学薬学部学術講演会、徳島文理大学、徳島 2013年12月19日(招待講演)

3. 特許

なし

4. 学会・シンポジウム等の開催状況

なし

5. 受賞等

(1) 梶川敬之(博士3年)

奨励賞 第53回天然有機化合物討論会、2011.12.19

6. 新聞報道等

なし

7. 国民との科学・技術対話

なし

8. 領域内の共同研究の準備・実施状況とその成果

なし