

CURRICULUM VITAE

Harunobu MITSUNUMA

Graduate School of Pharmaceutical Sciences, Prof. Kanai Group

The University of Tokyo

7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

Tel: (+81)-3-5841-4833

FAX: (+81)-3-5864-5206

E-mail: h-mitsunuma@mol.f.u-tokyo.ac.jp

Education/Career

2010.3 **BS**

Graduate School of Pharmaceutical Sciences, The University of Tokyo

Under the supervision of Prof. Masakatsu Shibasaki

2012.3 **Master**

Graduate School of Pharmaceutical Sciences, The University of Tokyo

Under the supervision of Prof. Motomu Kanai

2015.3 **Ph.D.**

Graduate School of Pharmaceutical Sciences, The University of Tokyo

Under the supervision of Prof. Motomu Kanai

2015.4-2017.10 **Research Scientist**

Sumitomo Dainippon Pharma Co., Ltd.

Drug Development Chemistry Group I, Drug Development Research Laboratories

2017.10-2017.12 **Postdoctoral Fellows**

Graduate School of Pharmaceutical Sciences, The University of Tokyo

Under the supervision of Prof. Motomu Kanai

2018.1-present **Assistant Professor**

Graduate School of Pharmaceutical Sciences, The University of Tokyo

Under the supervision of Prof. Motomu Kanai

2022.10-present **JST PRESTO researcher** "Development of Basic Material Conversion Science for Global Environment"

2012.8-2012.12 **Visiting Scientist**

Department of Chemistry, University of California, Berkeley

Under the supervision of Prof. John F. Hartwig

Fellowship & Grant

2012.4-2015.3 Research Fellow of the Japan Society for the Promotion of Sciences (DC1) [fellowship]

2018.10-2020.9 JSPS Grant-in-Aid for Research Activity Start-up #18H05969, #19K21123 [research grant]

2020.10-2024.3 MEXT Grant-in-Aid for Scientific Research on Transformative Research Areas (A) #20H05843 [research grant]

2021.4-2023.3 JSPS Grant-in-Aid for Young Scientists #21K15220 [research grant]

2021.10-2023.9 Research Grant from ENEOS [research grant]

2022.4 薬学振興会 基礎的研究助成 [research grant]

2022.10-2026.3 JST PRESTO #JPMJPR2279

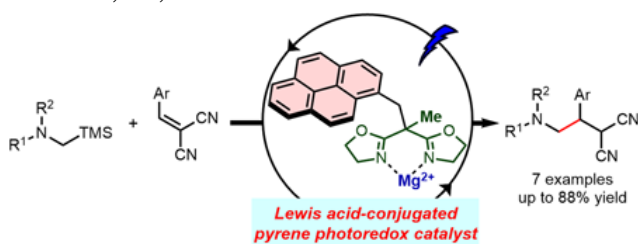
Award

2019 Teijin Pharmaceutical Award in Synthetic Organic Chemistry (SSOCJ, Japan)

2020 JISEDAI Symposium Lectureship Award (CSJ, Japan)

Publication

1. Attenuation of α -synuclein aggregation by catalytic photo-oxygenation
Iwai, A.; Nakamura, R.; Tomizawa, I.; **Mitsunuma, H.**; Hori, Y.; Tomita, T.; Sohma, Y.*; Kanai, M.*
Submitted.
2. Quantitative Assays for Catalytic Photo-Oxygenation of Alzheimer Disease-Related Tau Proteins
Umeda, H.; Sawazaki, T.; Furuta, M.; Suzuki, T.; Kawashima, S. A.; **Mitsunuma, H.**; Hori, Y.; Tomita, T.; Sohma, Y.; Kanai, M.*
Submitted.
3. Lewis Acid-Conjugated Pyrene Photoredox Catalyst Promoting the Addition Reaction of α -Silyl Amines with Benzalmalononitriles
Katayama, Y.; **Mitsunuma, H.***; Kanai, M.*
Chem. Pharm. Bull. **2022**, *70*, 765-768.

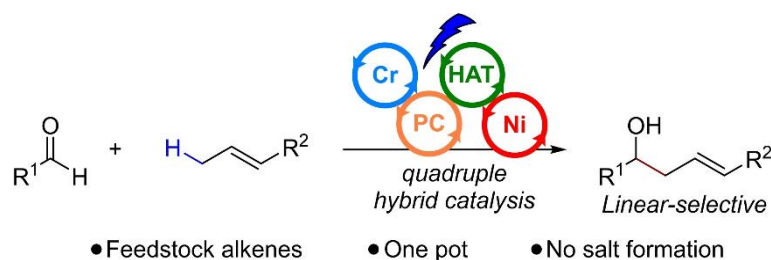


4. Linear-Selective Allylation of Aldehydes with Simple Alkenes Mediated by Quadruple Hybrid Catalysis

Irie, Y.; Chen, H.; Fuse, H.; **Mitsunuma, H.***; Kanai, M.*

Adv. Synth. Catal. **2022**, *364*, 3378-3383.

*Special Issue: Dedicated to Andreas Pfaltz.



5. Site-Selective α -Alkylation of 1,3-Butanediol Using a Thiophosphoric Acid Hydrogen Atom Transfer Catalyst

Nakao, H.; **Mitsunuma, H.***; Kanai, M.*

Chem. Pharm. Bull. **2022**, *70*, 540-543.

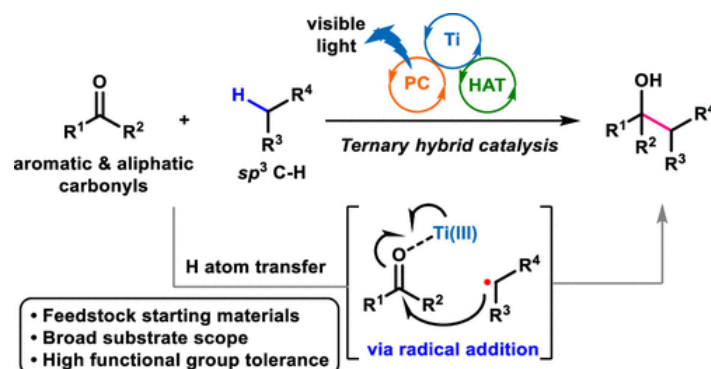


6. A Catalytic Alkylation of Ketones via sp^3 C–H Bond Activation

Peng, X.; Hirao, Y.; Yabu, S.; Sato, H.; Higashi, M.; Akai, T.; Masaoka, S.;

Mitsunuma, H.*; Kanai, M.*

J. Org. Chem. **2022**, ASAP. DOI: 10.1021/acs.joc.2c00603



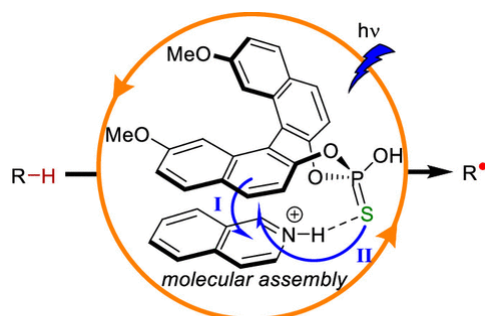
7. Identification of a Self-Photosensitizing Hydrogen Atom Transfer Organocatalyst System

Fuse, H.; Irie, Y.; Fuki, M.; Kobori, Y.; Kato, K.; Yamakata, A.; Higashi, M.;

Mitsunuma, H.*; Kanai, M.*

J. Am. Chem. Soc. **2022**, *144*, 6566-6574.

* Highlighted by Department News release, JACS Spotlights.

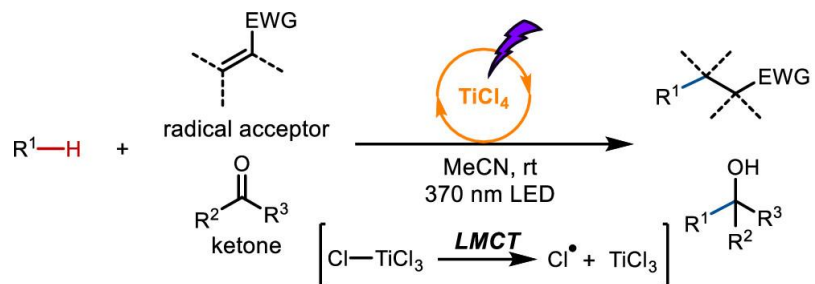


- HAT via photo-induced sequential SET
- Activation of formyl, α -oxy, and benzylic C-H bonds
- Application to 4 types of reactions
- Spectroscopic studies and theoretical calculation

8. Titanium(IV) Chloride-Catalyzed Photoalkylation via C(sp³)-H Bond Activation of Alkanes

Yamane, M.; Kanzaki, Y.; **Mitsunuma, H.***; Kanai, M.*

Org. Lett. **2022**, *24*, 1486-1490.



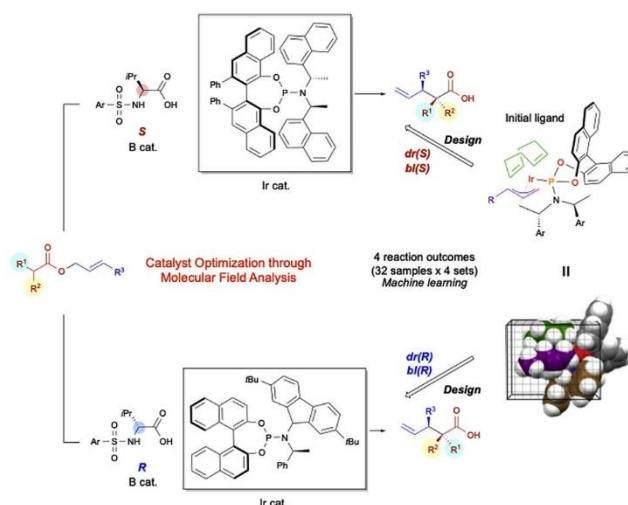
- Inexpensive metal catalyst
- Use of feedstock materials
- Addition to ketones

9. Data-driven catalyst optimization for stereodivergent asymmetric synthesis by iridium/boron hybrid catalysis

Chen, H.; Yamaguchi, S.*; Morita, Y.; Nakao, H.; Zhai, X.; Shimizu, Y.; **Mitsunuma, H.***; Kanai, M.*

Cell Rep. Phys. Sci. **2021**, *3*, 100679.

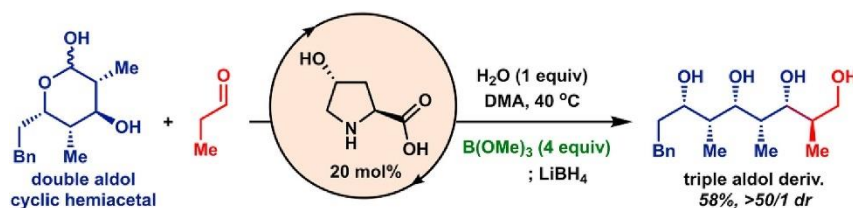
*Highlighted by Department News release, 日刊工業新聞, 化学工業日報, 日本経済新聞.



10. A 4-hydroxyproline/trimethyl borate system for asymmetric synthesis of triple aldols from double aldol cyclic hemiacetals

Hirao, Y.; Kanzaki, Y.; **Mitsunuma, H.***; Kanai, M.*

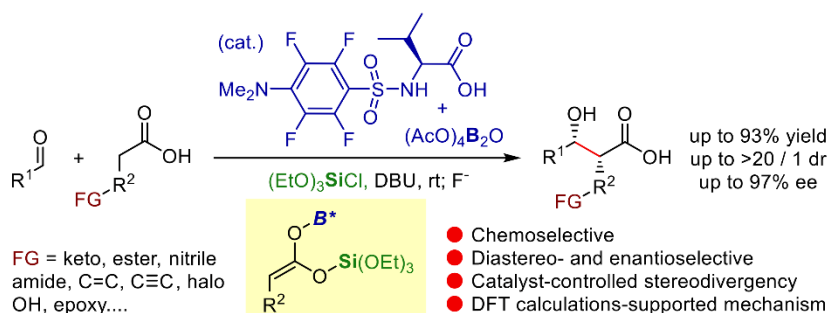
Tetrahedron **2021**, *98*, 132448.



11. Siloxy Esters as Traceless Activators of Carboxylic Acids: Boron-Catalyzed Chemoselective Asymmetric Aldol Reaction

Fujita, T.; Yamane, M.; Sameera, W. M. C.; **Mitsunuma, H.***; Kanai, M.*

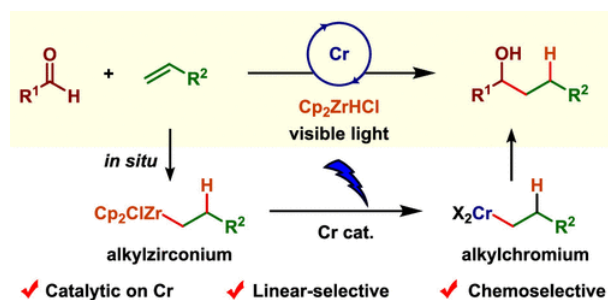
Angew. Chem. Int. Ed. **2021**, *60*, 24598-24604.



12. Chromium-Catalyzed Linear-Selective Alkylation of Aldehydes with Alkenes

Hirao, Y.; Katayama, Y.; **Mitsunuma, H.***; Kanai, M.*

Org. Lett. **2020**, *22*, 8584-8588.

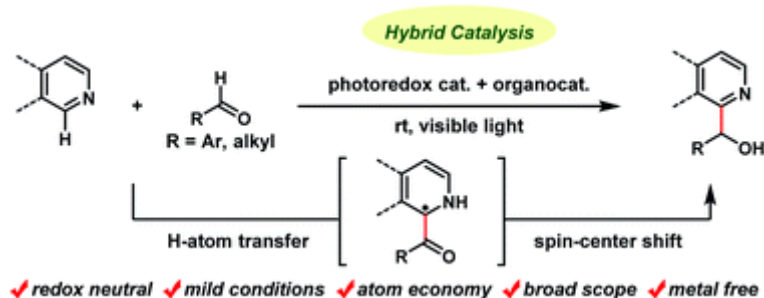


13. Photocatalytic redox-neutral hydroxyalkylation of N-heteroaromatics with aldehydes

Fuse, H.; Nakao, H.; Saga, Y.; Fukatsu, A.; Kondo, M.; Masaoka, S.: [Mitsunuma, H.*](#); Kanai, M.*

Chem. Sci. **2020**, *11*, 12206-12211.

*Highlighted by *Synfacts* **2021**, *17*, 0084.

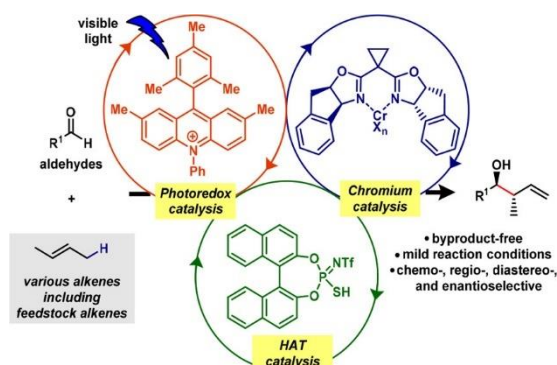


14. Catalytic Allylation of Aldehydes Using Unactivated Alkenes

Tanabe, S.; [Mitsunuma, H.*](#); Kanai, M.*

J. Am. Chem. Soc. **2020**, *142*, 12374-12381.

*Highlighted by Department News release.

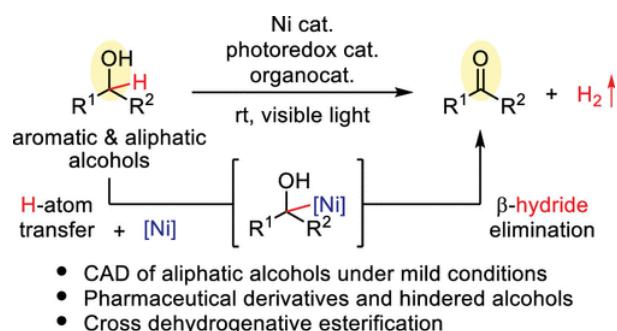


15. Catalytic Acceptorless Dehydrogenation of Aliphatic Alcohols.

Fuse, H.; [Mitsunuma, H.*](#); Kanai, M.*

J. Am. Chem. Soc. **2020**, *142*, 4493-4499.

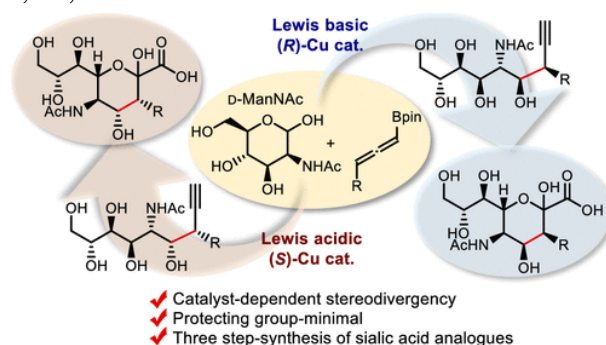
*Highlighted by Department News release.



16. Copper(I)-Catalyzed Stereodivergent Propargylation of N-Acetyl Mannosamine for Protecting Group Minimal Synthesis of C3-Substituted Sialic Acids

Ishizawa, K.; Majima, S.; Wei, X.-F.; **Mitsunuma, H.**; Shimizu, Y.; Kanai, M.

J. Org. Chem. **2019**, *84*, 10615-10628.

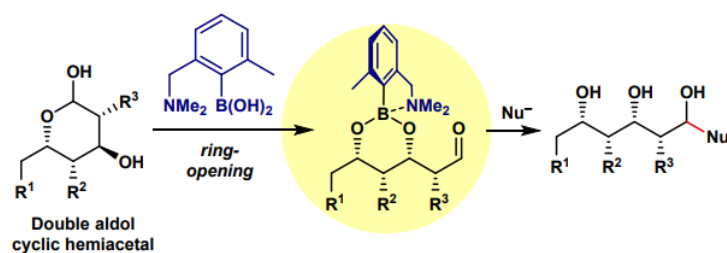


17. Amine-Tethered Phenylboronic Acid-Enabling Ring-Opening Strategy for Carbon Chain Elongation from Double Aldol Cyclic Hemiacetals

Kanzaki, Y.; Hirao, Y.; **Mitsunuma, H.***; Kanai, M.*

Org. Biomol. Chem. **2019**, *17*, 6562-6565.

* Invited to Synthetic methodology in OBC and Trends in Organoboron Chemistry.



18. Catalytic Asymmetric Allylation of Aldehydes with Alkenes Mediated by Organophotoredox and Chiral Chromium Hybrid Catalysis

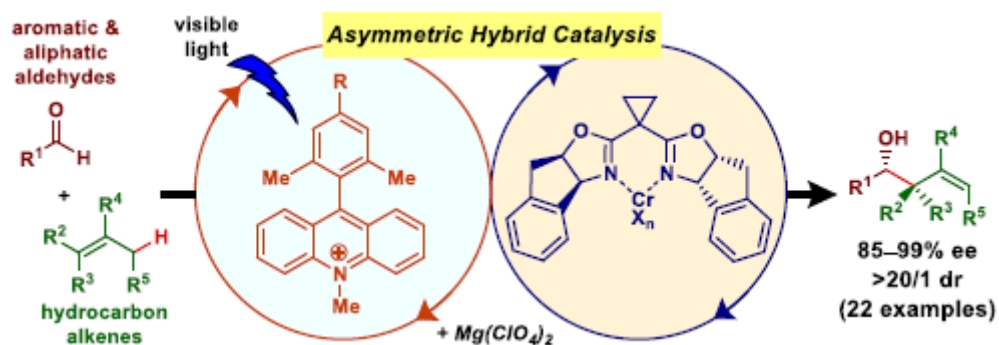
Mitsunuma, H.*; Tanabe, S.; Fuse, H.; Ohkubo, K.; Kanai, M.*

Chem. Sci. **2019**, *10*, 3459-3465.

*Highlighted by UT press release, Chem.Sci. Special Movie, 日経産業新聞

*Selected as 2019 Chemical Science HOT Article Collection and 2019 ChemSci Pick of the Week Collection

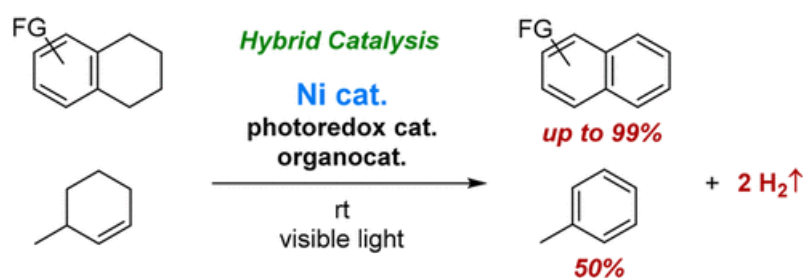
*Selected as Inside Front Cover



19. Acceptorless Dehydrogenation of Hydrocarbons by Noble-Metal-Free Hybrid Catalyst System

Fuse, H.; Kojima, M.; Mitsunuma, H.; Kanai, M.

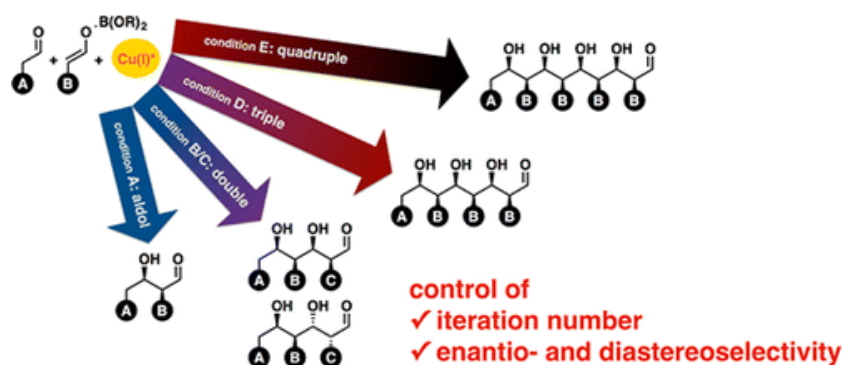
Org. Lett. **2018**, *20*, 2042-2045.



20. Catalytic Asymmetric Iterative/Domino Aldehyde Cross-Aldol Reactions for the Rapid and Flexible Synthesis of 1,3-Polyols.

Lin, L.; Yamamoto, K.; Mitsunuma, H.; Kanzaki, Y.; Matsunaga, S.; Kanai, M.

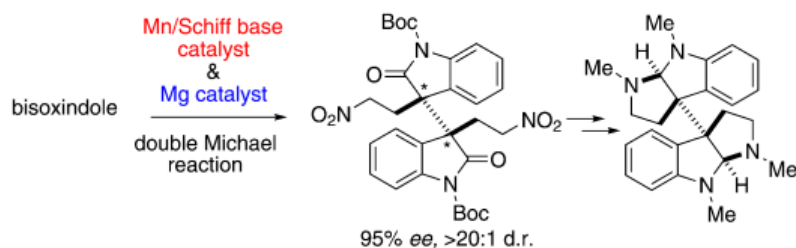
J. Am. Chem. Soc. **2015**, *137*, 15418-15421.



21. Catalytic Asymmetric Total Synthesis of Chimonanthine, Folicanthine, and Calycanthine via Double Michael Reaction of Bisoxindole

Mitsunuma, H.; Shibasaki, M.; Kanai, M.; Matsunaga, S.

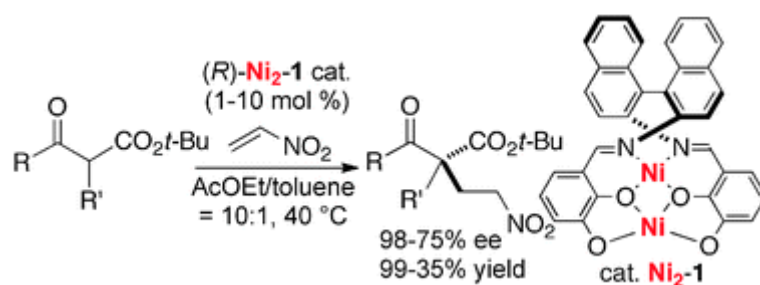
Angew. Chem. Int. Ed. **2012**, *51*, 5217-5221.



22. Dinuclear Ni₂-Schiff base complex-catalyzed asymmetric 1,4-addition of β-keto esters to nitroethylene toward γ^{2,2}-amino acid synthesis

Mitsunuma, H.; Matsunaga, S.

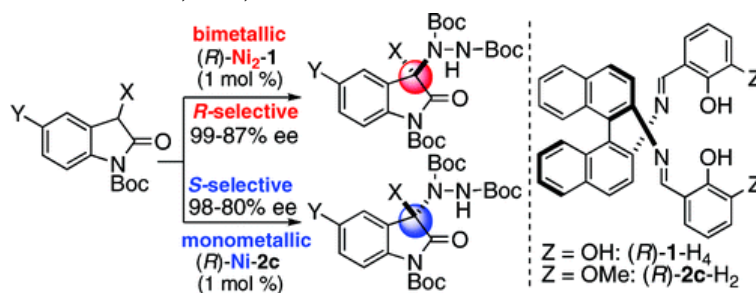
Chem. Commun. **2011**, 47, 469-471.



23. Catalytic Asymmetric Synthesis of 3-Aminooxindoles: Enantiofacial Selectivity Switch in Bimetallic vs Monometallic Schiff Base Catalysis

Mouri, S.; Chen, Z.; **Mitsunuma, H.**; Furutachi, M.; Matsunaga, S.; Shibasaki, M.

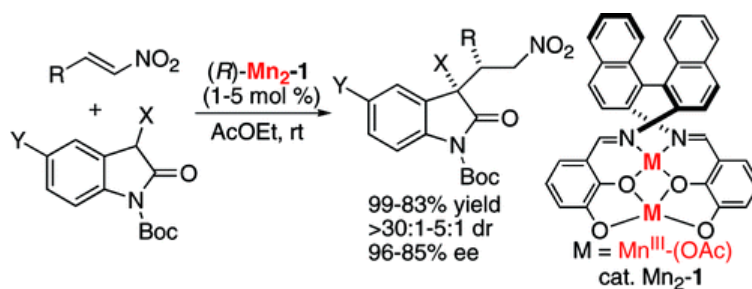
J. Am. Chem. Soc. **2010**, 132, 1255-1257.



24. A Homodinuclear Mn(III)₂-Schiff Base Complex for Catalytic Asymmetric 1,4-Additions of Oxindoles to Nitroalkenes.

Kato, Y.; Furutachi, M.; Chen, Z.; **Mitsunuma, H.**; Matsunaga, S.; Shibasaki, M.

J. Am. Chem. Soc. **2009**, 131, 9168-9169.



Review

1. Recent Progress of Chromium-Mediated Carbonyl Addition Reactions

Katayama, Y.; **Mitsunuma, H.***; Kanai, M.*

Synthesis **2021**, *54*, 1684-1694. [review]

References

Motomu Kanai, Ph.D., Professor

Graduate School of Pharmaceutical Sciences, The University of Tokyo

7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

Tel: (+81)-3-5841-4830

FAX: (+81)-3-5864-5206

E-mail: kanai@mol.f.u-tokyo.ac.jp

Shigeki Matsunaga, Ph.D., Professor

Faculty of Pharmaceutical Sciences, Hokkaido University

Kita-12 Nishi-6, Kita-ku, Sapporo 060-0812, Japan

Tel: (+81)-11-706-3236

FAX: (+81)-11-706-4981

E-mail: kanai@mol.f.u-tokyo.ac.jp