

Satoshi KAMIGUCHI

Fax : +81-(0)48-467-9391

E-mail : kamigu@riken.jp



Education

1994 B.Sc. Faculty of Science, the University of Tokyo (Japan)
(Supervisor: Prof. Taro Saito)

1996 M.Sc. School of Science, the University of Tokyo (Japan)
(Supervisor: Prof. Taro Saito)

1999 Ph.D. School of Science, the University of Tokyo (Japan)
(Supervisor: Prof. Taro Saito)

Research and professional experience

1999-2000 Special Postdoctoral Researcher, Chemical Analysis Team, RIKEN

2000-2008 Research Scientist, Chemical Analysis Team, RIKEN

2008-2011 Senior Research Scientist, Chemical Analysis Team, RIKEN

2011-2013 Senior Research Scientist, Materials Characterization Team, RIKEN

2013-Present Senior Research Scientist, Organometallic Chemistry Laboratory, RIKEN

2013-Present Senior Research Scientist, Advanced Catalysis Research Group, RIKEN Center for Sustainable Research Science

Concurrent posts

2003 Part-time Lecturer, Graduate School of Science and Engineering,
Saitama University

2009-Present Visiting Associate Professor, Graduate School of Science and
Engineering,

2011/4-2011/9 Part-time Lecturer, Ochanomizu University

Publications

- S. Kamiguchi, "New ammonia synthesis method using ultra-small metal cluster catalysts", *MDB Technology Forecast Report - Technology that will change the future and the world in 2050*, Apr. **2025**. (In Japanese) **(Review)**
- S. Kamiguchi, "Development and future view of ultra-small metal cluster catalysts for ammonia synthesis", *J. Hydrog. Energy Syst. Soc. Jpn.*, **2024**, Vol. 49, pp. 207-213. (In Japanese) **(Review)**
- S. Kamiguchi*, K. Asakura, T. Shibayama, T. Yokaichiya, T. Ikeda, A. Nakayama*, K. Shimizu, Z. Hou, "Catalytic ammonia synthesis on HY-zeolite-supported angstrom-size molybdenum cluster", *Chem. Sci.*, **2024**, Vol. 15, pp.2914-2922. **(Original paper)**
Press Release (English) https://www.riken.jp/en/news_pubs/research_news/pr/2024/20240422_3/index.html
Press Release (Japanese) https://www.riken.jp/press/2024/20240122_2/index.html
- S. Kamiguchi*, S. Nagashima, T. Chihara, "Application of solid-state early-transition metal clusters as catalysts", *Tetrahedron Lett.*, **2018**, Vol. 59, pp. 1337-1342. (Digest paper) **(Review)**

- S. Nagashima*, T. Takahashi, N. Nasrin, S. Kamiguchi, and T. Chihara, "Synthesis of Chromenes by Cyclizative Condensation of Phenols with α,β -Unsaturated Carbonyl Compounds over Halide Cluster Catalysts", *Chem. Lett.*, **2016**, Vol. 45, pp.1321–1323. **(Original paper)**
- S. Kamiguchi*, K. Arai, K. Okumura, H. Iida, S. Nagashima, T. Chihara, "Solid-state molybdenum sulfide clusters with an octahedral metalframework as hydrogenation, dehydrogenation, and hydrogenolysiscatalysts similar to the platinum group metals", *Appl. Catal. A: General*, **2015**, Vol. 505, pp. 417–421. **(Original paper)**
- S. Kamiguchi*, R. Kajio, H. Yamada, H. Yuge, K. Okumura, H. Iida, S. Nagashima, and T. Chihara, "Thermal Activation of Solid-State Molybdenum Halide Clusters with an Octahedral Cluster Framework and Their Application to Catalytic Synthesis of 3-Methylpyridine from Piperidine and Methanol", *Bull. Chem. Soc. Jpn.*, **2015**, Vol. 88, pp. 1116–1122. **(Original paper)**
- S. Kamiguchi*, K. Okumura, S. Nagashima, T. Chihara, "Catalytic Dehydrogenation of Alcohol over Solid-State Molybdenum Sulfide Clusters with an Octahedral Metal Framework", *Mater. Res. Bull.*, **2015**, Vol. 72, pp. 188–190. **(Original paper)**
- S. Nagashima*, T. Sasaki, S. Kamiguchi, T. Chihara, "Synthesis of Common-sized Heterocyclic Compounds by Intramolecular Cyclization", *Chem. Lett.*, **2015**, Vol. 44, pp. 764–766. **(Original paper)**
- S. Kamiguchi*, Y. Seki, A. Satake, Okumura, S. Nagashima, T. Chihara, "Catalytic Cracking of Methyl *tert*-Butyl Ether to Isobutene over Brønsted and Lewis Acid Sites on Solid-state Molybdenum Sulfide Clusters with an Octahedral Metal Framework.", *J. Clust. Sci.*, **2015**, Vol. 26, pp. 653–660. **(Original paper)**
- S. Nagashima*, H. Nagashima, S. Furukawa, S. Kamiguchi, H. Kurokawa, T. Chihara, "Catalytic ring-opening addition of thiols to epoxides in the gas-phase over molecular rhenium sulfide cluster complexes [Re₆S₈X₆] (X= Cl, OH, H₂O) with retention of their octahedral metal frameworks", *Appl. Catal. A: General*, **2015**, Vol. 497, pp. 167–175. **(Original paper)**
- S. Nagashima*, S. Furukawa, S. Kamiguchi, R. Kajio, H. Nagashima, A. Yamaguchi, M. Shirai, H. Kurokawa, T. Chihara, "Catalytic Activity of Molecular Rhenium Sulfide Clusters [Re₆S₈(OH)_{6-n}(H₂O)_n]⁽⁴⁻ⁿ⁾⁻ (n = 0, 2, 4, 6) with Retention of the Octahedral Metal Frameworks: Dehydrogenation and Dehydration of 1,4-Butanediol", *J. Clust. Sci.*, **2014**, Vol. 24, pp. 1203–1224. **(Original paper)**
- S. Nagashima, S. Kamiguchi*, T. Chihara, "Catalytic Reactions over Halide Cluster Complexes of Group 5–7 Metals", *Metals*, **2014**, Vol. 4, pp. 215–313. **(Review)**
- S. Kamiguchi*, S. Nagashima, T. Chihara, "Characterization of Catalytically Active Octahedral Metal Halide Cluster Complexes", *Metals*, **2014**, Vol. 4, pp. 84–107. **(Review)**
- S. Nagashima, H. Yamazaki, K. Kudo, S. Kamiguchi, T. Chihara*, "S-Acylation of aliphatic and aromatic thiols with carboxylic acids and their esters over solid acid catalysts in the gas phase at temperatures above 200 °C", *Appl. Catal. A: General*, **2013**, Vol. 464–465, pp. 332–338. **(Original paper)**
- S. Kamiguchi*, K. Takeda, R. Kajio, K. Okumura, S. Nagashima, T. Chihara, "Application of Solid-State Molybdenum Sulfide Clusters with an Octahedral Metal Framework to Catalysis: Ring-Opening of Tetrahydrofuran to Butyaldehyde", *J. Clust. Sci.*, **2013**, Vol. 24, pp. 559–574. **(Original paper)**
- S. Nagashima, K. Kudo, H. Yamazaki, S. Kamiguchi, T. Chihara*, "Gas-phase S-alkylation of benzenethiol with aliphatic alcohols, ethers, esters, alkyl halides and olefins over halide cluster catalysts of Groups 5 and 6 transition metals", *Appl. Catal. A: General*, **2013**, Vol. 450, pp. 50–56. **(Original paper)**

- S. Nagashima, S. Kamiguchi, S. Ohguchi, T. Chihara*, "Gas-Phase Alkylation of Pyridine and Phenol with Alcohols over Halide Clusters of Group 5–7 Transition Metals as Solid Acid Catalysts", *J. Clust. Sci.*, **2011**, Vol. 22, pp. 647–660. **(Original paper)**
- S. Nagashima, S. Kamiguchi*, S. Ohguchi, T. Chihara, "Vapor-phase Beckmann rearrangement of cyclohexanone oxime over halide cluster catalysts", *Catal. Today*, **2011**, Vol. 164, pp. 135–138. **(Original paper)**
- S. Nagashima*, S. Kamiguchi, K. Kudo, T. Sasaki, T. Chihara, "Intramolecular Condensation of 1,2-C₆H₄(CH₂RH)₂ (R = O, S, and NH) to Yield Heterocyclic Compounds over Halide-cluster Catalysts", *Chem. Lett.*, **2011**, Vol. 40, pp. 78–80. **(Original paper)**
- S. Nagashima, S. Kamiguchi*, S. Ohguchi, T. Chihara, "Direct synthesis of 3-methylbenzofuran from phenol and acetone over halide cluster catalysts taking advantage of acidic and metallic properties", *Chem. Eng. J.*, **2010**, Vol. 161, pp. 384–387. **(Original paper)**
- S. Nagashima, S. Kamiguchi, T. Chihara, "Application of halide cluster complexes to new catalytic reactions", *Petrotech*, **2010**, Vol. 33, pp. 881–887. (In Japanese) **(Review)**
- S. Kamiguchi*, N. Ikeda, S. Nagashima, H. Kurokawa, H. Miura, T. Chihara, "Catalytic Condensation of Primary Amines, Dehydrogenation of Secondary Amines, and Dealkylation of Tertiary Amines over Solid-state Rhenium Sulfide Clusters with an Octahedral Metal Framework", *J. Clust. Sci.*, **2009**, Vol. 20, pp. 683–693. **(Original paper)**
- S. Kamiguchi, I. Takahashi, S. Nagashima, A. Nakamura, T. Chihara*, "Catalytic N-Alkylation of Amines with Primary Alcohols over Halide Clusters", *J. Clust. Sci.*, **2007**, Vol. 18, pp. 935–945. **(Original paper)**
- S. Kamiguchi*, I. Takahashi, K. Kondo, S. Nagashima, H. Kurokawa, H. Miura, T. Chihara, "Catalytic Hydration of Alkynes over Brønsted Acid Sites on Developed on Halide Clusters", *J. Clust. Sci.*, **2007**, Vol. 18, pp. 845–853. **(Original paper)**
- S. Kamiguchi*, S. Nagashima, T. Chihara, "Catalytic Hydrogenation and Dehydrogenation over Solid-state Rhenium Sulfide Clusters with an Octahedral Metal Framework", *Chem. Lett.*, **2007**, pp. 1340–1341. **(Original paper)**
- S. Kamiguchi, S. Nagashima, K. Komori, M. Kodomari, T. Chihara*, "Thermal Activation of Molecular Tungsten Halide Clusters with the Retention of an Octahedral Metal Framework and the Catalytic Dehydration of Alcohols to Olefins as a Solid Acid Catalyst", *J. Clust. Sci.*, **2007**, Vol. 18, pp. 414–430. **(Original paper)**
- S. Kamiguchi, S. Nagashima, T. Chihara, "Halide cluster catalyst and its crystallinity", *Shokubai*, **2007**, Vol. 49, pp. 554–559. (In Japanese) **(Review)**
- S. Kamiguchi, T. Chihara, "Utilization of halide clusters as catalysts", *Kagaku Kogyo*, **2007**, Vol. 58, pp. 16–20. (In Japanese) **(Review)**
- S. Kamiguchi*, S. Takaku, M. Kodomari, T. Chihara, "Variable catalytic behavior of Nb, Mo, Ta, W, and Re halide clusters: isomerization of alkynes to conjugated dienes under nitrogen and hydrogenation to alkenes under hydrogen", *J. Mol. Catal. A.*, **2006**, Vol. 260, pp. 43–48. **(Original paper)**
- S. Kamiguchi, S. Nishida, I. Takahashi, H. Kurokawa, H. Miura, T. Chihara*, "Aldol condensation of acyclic ketones with benzaldehyde and subsequent cyclodehydration to form indenenes over halide cluster catalysts", *J. Mol. Catal. A.*, **2006**, Vol. 255, pp. 117–122. **(Original paper)**

- S. Kamiguchi, I. Takahashi, H. Kurokawa, H. Miura, T. Chihara*, "Vapor-phase synthesis of 1,2-dihydro-2,2,4-trimethylquinolines from anilines and acetone over group 5–7 metal halide clusters as catalysts", *Appl. Catal. A: General*, **2006**, Vol. 309, pp. 70–75. **(Original paper)**
- S. Kamiguchi, T. Mori, M. Watanabe, A. Suzuki, M. Kodomari, M. Nomura, Y. Iwasawa, T. Chihara*, "Retention of the octahedral metal framework of Nb and Mo halide clusters in catalytic decomposition of phenyl acetate to phenol and ketene", *J. Mol. Catal. A.*, **2006**, Vol. 253, pp. 176–186. **(Original paper)**
- S. Kamiguchi, "Challenge to development of completely new catalysts – Development of metal halide cluster-catalyzed novel reactions", *Kagaku to Kogyo*, **2006**, Vol. 59, pp. 127–131. (In Japanese) **(Review)**
- S. Kamiguchi, A. Nakamura, A. Suzuki, M. Kodomari, M. Nomura, Y. Iwasawa, T. Chihara*, "Catalytic dehydrogenation of aliphatic amines to nitriles, imines, or vinylamines and dealkylation of tertiary aliphatic amines over halide cluster catalysts of group 5 and 6 transition metals", *J. Catal.*, **2005**, Vol. 230, pp. 204–213. **(Original paper)**
- S. Kamiguchi, S. Nishida, M. Kodomari, T. Chihara*, "Catalytic Hydrodehydration of Cyclohexanone, Hydrogenation of 2-Cyclohexen-1-one, and Dehydrogenation of Cyclohexenone over an Mo Chloride Cluster with an Octahedral Metal Framework", *J. Clust. Sci.*, **2005**, Vol. 16, pp. 77–91. **(Original paper)**
- S. Kamiguchi, S. Nishida, H. Kurokawa, H. Miura, T. Chihara*, "Formation of Brønsted acid site on halide clusters of Group 5 and 6 transition metals Catalytic methylation and demethylation of methylbenzenes with methanol", *J. Mol. Catal. A.*, **2005**, Vol. 226, pp. 1–9. **(Original paper)**
- S. Kamiguchi, K. Kondo, M. Kodomari, T. Chihara*, "Catalytic ring-attachment isomerization and dealkylation of diethylbenzenes over halide clusters of group 5 and group 6 transition metals", *J. Catal.*, **2004**, Vol. 223, pp. 54–63. **(Original paper)**
- S. Kamiguchi, S. Iketani, M. Kodomari, T. Chihara*, "Catalytic Dehydrogenation of Ethylbenzene in Helium and Reductive Dealkylation in Hydrogen on Nb, Mo, Ta, W, and Re Halide Clusters", *J. Clust. Sci.*, **2004**, Vol. 15, pp. 19–31. **(Original paper)**
- S. Kamiguchi, M. Watanabe, K. Kondo, M. Kodomari, T. Chihara*, "Catalytic dehydrohalogenation of alkyl halides by Nb, Mo, Ta, and W halide clusters with an octahedral metal framework and by a Re chloride cluster with a triangular metal framework", *J. Mol. Catal. A.*, **2003**, Vol. 203, pp. 153–163. **(Original paper)**
- S. Kamiguchi, M. Noda, Y. Miyagishi, S. Nishida, M. Kodomari, T. Chihara*, "Catalytic isomerization of 1-hexene to 2-hexene by halide clusters of Nb, Mo, Ta, and W possessing an octahedral metal core", *J. Mol. Catal. A.*, **2003**, Vol. 195, pp. 159–171. **(Original paper)**
- S. Kamiguchi, T. Chihara*, "Catalytic dehydration of alcohol to olefin and ether by halide clusters of Nb, Mo, Ta and W possessing an octahedral metal core", *Catal. Lett.*, **2003**, Vol. 85, pp. 97–100. **(Original paper)**
- T. Chihara*, S. Kamiguchi, "Catalytic decomposition of phenyl acetate by halide clusters of Nb, Mo, Ta, and W possessing octahedral metal core", *Chem. Lett.*, **2002**, pp. 70–71. **(Original paper)**
- S. Kamiguchi*, T. Saito, W. Mori, "Magnetic properties of the octahedral chromium chalcogenide cluster complexes $[\text{Cr}_6\text{Se}_8(\text{PEt}_3)_6]$, $[\text{Cr}_6\text{Se}_8(\text{H})(\text{PEt}_3)_6]$, and $[\text{Cr}_6\text{S}_8(\text{H})(\text{PEt}_3)_6]$ ", *Bull. Chem. Soc. Jpn.*, **2000**, Vol. 73, pp. 2487–2491. **(Original paper)**

- S. Kamiguchi* and T. Chihara, "Synthesis and structure of molybdenum-cobalt bimetallic carbide cluster $[N(PPh_3)_2][Mo_3Co_3(\mu_6-C)(\mu-CO)_3(CO)_{15}]$ bearing only carbonyl ligands", *J. Clust. Sci.*, **2000**, Vol. 11, pp. 483–492. **(Original paper)**
- S. Kamiguchi*, T. Saito, Z. Honda, "Synthesis, structure, ESI mass spectrum and magnetic property of a monocationic cluster complex of chromium sulfide with a hydrido ligand $[Cr_6S_8(H)(PEt_3)_6](BF_4)^+$ ", *J. Organomet. Chem.*, **2000**, Vol. 609, pp. 184–188. **(Original paper)**
- T. Chihara*, M. Sato, H. Konomoto, S. Kamiguchi, H. Ogawa, Y. Wakatsuki, "Synthesis and characterization of high-nuclearity iridium-ruthenium and -gold mixed-metal carbonyl clusters, $[Ir_7Ru_3(CO)_{23}]^-$, $[Ir_7Ru_3(CO)_{23}(AuPPh_3)]^-$, and $[Ir_6Ru_3(CO)_{21}(AuPPh_3)]^-$, possessing tetrahedrally capped octahedral iridium cores obtained by capping reactions with $[Ru_3(CO)_{12}]$ and $[AuCl(PPh_3)]$ ", *J. Chem. Soc. Dalton Trans.*, **2000**, pp. 2295–2299. **(Original paper)**
- S. Kamiguchi*, H. Imoto, T. Saito, T. Chihara, "Synthesis, structure, FAB mass spectrum, and magnetic property of a dodecanuclear cluster complex with hydrido ligands $[Cr_{12}S_{16}(H)_2(PEt_3)_{10}]^+$ ", *Solid State Sci.*, **1999**, Vol. 1, pp. 497–508. **(Original paper)**
- S. Kamiguchi, H. Imoto*, T. Saito, T. Chihara, "Syntheses, structures, FAB mass spectra, and magnetic properties of chromium cluster complexes $[Cr_6Se_8(PEt_3)_6]$, $[Cr_6Se_8(H)(PEt_3)_6]$, and $[Cr_6S_8(H)(PEt_3)_6]$ ", *Inorg. Chem.*, **1998**, Vol. 37, pp. 6852–6857. **(Original paper)**
- S. Kamiguchi, H. Imoto, T. Saito*, "Synthesis, structure, and electrochemistry of a dodecanuclear chromium cluster complex $[Cr_{12}S_{16}(PEt_3)_{10}]^+$ ", *Chem. Lett.*, **1996**, pp. 555–556. **(Original paper)**

Patent

- S. Kamiguchi, Z. Hou, C. T. To, "Ammonia synthesis catalyst containing metal cluster, and use thereof", JP7099722, Registered on July 12, 2022.

Award

- S. Kamiguchi, "Development and social implementation of ammonia synthesis technology using ultra-small metal cluster catalysts", The 6th TCI Venture Award, Seed Division, Excellence Award, December 2025.
- S. Kamiguchi, "Catalytic ammonia synthesis by supported molybdenum metal cluster – Sustainable synthesis under milder conditions", The 38th RIKEN-Industry Collaboration Forum, Gold Award, June 2025.
- S. Kamiguchi, "Ammonia synthesis by supported ultra-small metal cluster catalysts", CSRS Incentive Award, April 2025.

Others

- An interview was featured in RIKEN Close-up Science Road on March 24, 2025. (In Japanese) https://www.riken.jp/pr/closeup/2025/20250324_1/index.html