

**Full Name:** Hiroshi Kitagawa

**Affiliations:** Division of Chemistry, Graduate School of Science, Kyoto University

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<https://www.kyoto-u.ac.jp/en/access/north-campus-map.html>

**Research Fields:**

Solid-state Chemistry, Coordination Chemistry, Inorganic Chemistry, Multi-element Nano Science

**Research Interests:**

- 1) Low-dimensional electron systems situated on dimensional crossover region
- 2) Solid-state protonics using MOFs and SurMOFs, and nano-ionics using nanomaterials
- 3) Creation of Novel Solid-Solution Alloy Nanoparticles on the Basis of Density-of-States Engineering by Interelement Fusion
- 4) Molecular conductors and conducting MOFs

**Diplomas:**

March 1986 The degree of B.Sc, Faculty of Science, Kyoto University

March 1988 The degree of M.Sc. in Chemistry Master's Course, Faculty of Science, Kyoto University

March 1991 Finished Doctoral Course, Faculty of Science, Kyoto University

March 1992 The degree of Doctor of Science from Kyoto University for a thesis entitled "Systematic Studies on the Mixed-Valence States of Perovskite-Type Transition-Metal Complexes  $Cs_2Au_2X_6$  ( $X = Cl, Br, I$ )"

**Academic Carriers:**

1991-1994 Assistant Professor, Institute for Molecular Science (IMS)

1994-2000 Assistant Professor, Japan Advanced Institute of Science & Technology (JAIST)

2000-2003 Associate Professor, Department of Chemistry, University of Tsukuba

2003-2009 Professor, Department of Chemistry, Faculty of Science, Kyushu University

2009- Professor, Division of Chemistry, Graduate School of Science, Kyoto University

**Other Carriers:**

1993-1994 Visiting Researcher, Davy-Faraday Research Laboratory, Royal Institution of Great Britain

2000-2002 Visiting Associate Professor, Japan Advanced Institute of Science & Technology (JAIST)

2000-2004 Principal Investigator, Precursory Research for Embryonic Science & Technology (PRESTO), Japan Science and Technology Agency (JST)

2003-2005 Councilor, Japan Society of Coordination Chemistry

2004-2005 Young Observer for IUPAC General Assembly, IUPAC

2004-2005 Member of Steering Committee of Division 7 (Molecular Solids), The Physical Society of Japan

2004-2006 Associate Editor (Inorganic & Analytical Chemistry), Chemistry Letters, The Chemical Society of Japan

2005-2006 Member of Steering Committee for Liaison, The Japanese Society for Synchrotron Radiation Research

2005-2008 Executive Adviser to the President (Structural Reform), Kyushu University

2005-2012 Program Officer for the Special Coordination Funds for Promoting Science & Technology, Japan Science and Technology Agency (JST)

2006-2008 Visiting Professor, Institute for Molecular Science (IMS)

2006-2012 Research Director, Development of the Foundation for Nano-Interface Technology, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)

2007-2009 Vice Leader, Global Center of Excellence (G-COE) Program, Kyushu University

2007-2009 Technical Member of Science and Technology Committee, Council for Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT)

2007-2010 Visiting Researcher, Japan Atomic Energy Agency (JAEA)

2008-2009 Technical Member of Science and Technology Sub-Committee, Committee on Grants-in-Aid for Scientific Research, Japan Society for the Promotion of Science (JSPS)

2008-2009 Cooperative Professor, Inamori Frontier Research Center, Kyushu University

2008-2010 Working Group Assigned Member, Advanced Institute for Materials Research (AIMR), Tohoku University, World Premier International Research Center Initiative, Japan Society for the Promotion of Science (JSPS)

2008-2010 Councilor Member, SPring-8 Users Community, SPring-8

2008-2010 Visiting Researcher, RIKEN

2008-2012 Steering Committees Member, Japan Society for Molecular Science

2009-2010 Task-force Member for Research and Development Evaluation System Reform, Ministry of Education, Culture, Sports, Science and Technology (MEXT)

2009-2010 Concurrent Professor, Department of Chemistry, Faculty of Science, Kyushu University

2009-2013 Technical Member of Scientific Research Founding Review Section, Council for Science and Technology, Ministry of Education, Culture, Sports, Science and Technology (MEXT)

2009-2013 Project Leader, Basic Technology Development for Green Sustainable Chemical Process, New Energy and Industrial Technology Development Organization (NEDO)

2009-2018 Adjunct Professor, Inamori Frontier Research Center, Kyushu University

2010-2012 Vice President & Councilor, Japan Society of Coordination Chemistry  
2010-2014 Science Officer, Research Promotion Bureau, Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan  
2010-2017 Adjunct Professor, Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University  
2011-2012 Program Officer, Science & Technology System Reform Project, Japan Science and Technology Agency (JST)  
2011-2013 Dean of the Division of Chemistry, Graduate School of Science, Kyoto University  
2011-2015 Research Director, Creation of Innovative Functions of Intelligent Materials on the Basis of Element Strategy, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)  
2011-2015 Associate Editor-in-Chief, Nanosciences and Nanotechnologies: An International Journal  
2011-2016 Organizing Committee (Chair in Inorganic & Analytical Chemistry), 2015 International Chemical Congress of Pacific Basin Societies (Pacifichem2015)  
2012-2013 Chair of the Chemical Sciences and Society Summit (CS3), G5 in Chemistry  
2012-2014 Editorial Board Member, Nanotechnology Reviews  
2012-2021 Councilor Member, SPring-8 Users Community, SPring-8  
2012- Member, Science Council of Japan (22nd-25th)  
2013-2015 Nanotechnology & Materials Working Member, Energy Strategy Council, Cabinet Office  
2013- Concurrent Professor, School of Chemistry and Chemical Engineering, Nanjing University  
2014-2016 Investigation Committee Member for Comprehensive Resources and Energy, Ministry of Economy, Trade and Industry (METI)  
2014-2020 Deputy Executive Vice-President for Research, Kyoto University  
2015-2017 Councilor, Japan Society of Coordination Chemistry  
2015-2017 Technical Member of the 8th Science and Technology Committee of Nanotechnology & Materials, Ministry of Education, Culture, Sports, Science and Technology (MEXT)  
2015-2021 Program Officer & Research Director, Science and Creation of Innovative Catalysts, Precursory Research for Embryonic Science & Technology (PRESTO), Japan Science and Technology Agency (JST)  
2015-2019 Research Director, ACCEL "Creation of the Functional Materials on the Basis of the Inter-Element-Fusion Strategy and Their Innovative Applications", Japan Science and Technology Agency (JST)  
2015- International Advisory Board, European Journal of Inorganic Chemistry, Wiley  
2016- Editorial Board Member, Inorganic Chemistry Frontiers, Royal Society of Chemistry (RSC)  
2016- Fellow of the Royal Society of Chemistry (FRSC)  
2017-2019 Division Chair, Division of Coordination Chemistry, Chemical Society of Japan.  
2017- Adjunct Principal Investigator, Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University  
2017-2020 Deputy Executive Vice-President for Strategy Coordination, Kyoto University  
2017-2020 Vice Provost, Kyoto University  
2018- DFG Mercator Fellow, Technical University Munich, Germany  
2019- Honorary Professor, Xi'an Jiaotong University  
2019- Adjunct Professor, School of Materials Science and Engineering, Jiangsu University  
2020-2024 Chief Program Officer, Chemistry Group, Research Center for Science Systems, Japan Society for the Promotion of Science (JSPS)  
2020- Program Officer, Materials Science Panel, Fusion Oriented Research for Disruptive Science and Technology (FOREST), Japan Science and Technology Agency (JST)  
2020-2024 President, Japan Society of Coordination Chemistry  
2021- Program Officer & Research Director, Exploring Innovative Materials in Unknown Search Space, Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency (JST)  
2021- International Advisory Board, Angewandte Chemie International Edition, German Chemical Society (GDCh)  
2022-2024 Vice Dean of the Graduate School of Science, Kyoto University  
2022- Deputy Executive Vice-President for Planning and Strategy Coordination, Kyoto University  
2022- Vice Provost, Kyoto University  
2023- President, Kyoto University Alumni Association of Nara Prefecture  
2024- Associate Editor, Coordination Chemistry Research, Elsevier

#### Awards:

- The Chemical Society of Japan Award for Creative Work (2010)
- Inoue Prize for Science (2011)
- Marco Polo della Scienza Italiana (2013)
- European Advanced Materials Award (2014)
- The Commendation for Science and Technology by the Minister of Education, Science & Technology (2016)
- Fellow of the Royal Society of Chemistry (FRSC) (2016)
- DFG Mercator Fellow (2018)
- Honorary Professor, Xi'an Jiaotong University (2019)
- The Japan Society for Molecular Science Award (2024)

## Recent Selected Publications:

- Continuous-Flow Chemical Synthesis for Sub-2 nm Ultra-Multielement Alloy Nanoparticles Consisting of Group IV to XV Elements  
H. Minamihara, K. Kusada, T. Yamamoto, T. Toriyama, Y. Murakami, S. Matsumura, L. Kumara, O. Sakata, S. Kawaguchi, Y. Kubota, O. SEO, S. Yasuno, H. Kitagawa  
**J. Am. Chem. Soc.**, 145, 17136–17142 (2023).
- Noble-Metal High-Entropy-Alloy Nanoparticles: Atomic-Level Insight into the Electronic Structure  
D. Wu, K. Kusada, Y. Nanba, M. Koyama, T. Yamamoto, T. Toriyama, S. Matsumura, O. SEO, I. Gueye, J. Kim, L. Kumara, R. Singapulige, O. Sakata, S. Kawaguchi, Y. Kubota, H. Kitagawa  
**J. Am. Chem. Soc.**, 144, 3365–3369 (2022).
- Efficient Overall Water Splitting in Acid with Anisotropic Metal Nanosheets  
D. Wu, K. Kusada, S. Yoshioka, T. Yamamoto, T. Toriyama, S. Matsumura, Y. Chen, O. Seo, J. Kim, C. Song, S. Hiroi, O. Sakata, T. Ina, S. Kawaguchi, Y. Kubota, H. Kobayashi, H. Kitagawa  
**Nature Communications**, 12, 1145 (2021).
- Confined Water-Mediated High Proton Conduction in Hydrophobic Channel of A Synthetic Nanotube  
K. Otake, K. Otsubo, T. Komatsu, S. Dekura, J. Taylor, R. Ikeda, K. Sugimoto, A. Fujiwara, C. Chou, A. W. Sakti, Y. Nishimura, H. Nakai, H. Kitagawa  
**Nature Communications**, 11, 843 (2020).
- Proton Transfer in Hydrogen-Bonded Degenerate Systems of Water and Ammonia in Metal-Organic Frameworks  
D. Lim, M. Sadakiyo, H. Kitagawa  
**Chemical Science**, 10, 16–33 (2019) (Invited Review).
- Selective Control of Fcc and Hcp Crystal Structures in Au–Ru Solid-Solution Alloy Nanoparticles  
Q. Zhang, K. Kusada, D. Wu, T. Yamamoto, T. Toriyama, S. Matsumura, S. Kawaguchi, Y. Kubota, H. Kitagawa  
**Nature Communications**, 9, 510 (2018).
- Mixed-Valence Nickel Bis(azamacrocyclic) Compounds with Ghost-Leg-type Sheets  
R. Hashiguchi, K. Otsubo, M. Maesato, K. Sugimoto, A. Fujiwara, H. Kitagawa  
**Angew. Chem. Int. Ed.**, 56, 3838–3841 (2017).
- Crystalline Coordination Framework Endowed with Dynamic Gate-Opening Behaviour by Being Downsized to a Thin Film  
S. Sakaida, K. Otsubo, O. Sakata, C. Song, A. Fujiwara, M. Takata, H. Kitagawa  
**Nature Chemistry**, 8, 377–383 (2016).
- Creation of Novel Solid-Solution Alloy Nanoparticles on the Basis of Density-of-States Engineering by Interelement Fusion  
H. Kobayashi, K. Kusada, H. Kitagawa  
**Accounts of Chemical Research**, 48, 1551–1559 (2015).
- The Role of a Three Dimensionally Ordered Defect Sublattice on the Acidity of a Sulfonated Metal–Organic Framework  
J. Taylor, T. Komatsu, S. Dekura, K. Otsubo, M. Takata, H. Kitagawa  
**J. Am. Chem. Soc.**, 137, 11498–11506 (2015).
- Hydrogen Storage in Pd Nanocrystals Covered with a Metal-Organic Framework  
G. Li, H. Kobayashi, J. Taylor, R. Ikeda, Y. Kubota, K. Kato, M. Takata, T. Yamamoto, S. Toh, S. Matsumura, H. Kitagawa  
**Nature Materials**, 13, 802–806 (2014).
- Designer Coordination Polymers: Dimensional Crossover Architectures and Proton Conduction  
T. Yamada, K. Otsubo, R. Makiura, H. Kitagawa  
**Chemical Society Reviews**, 42, 6655–6669 (2013).
- Bottom-up Realization of a Porous Metal-Organic Nanotubular Assembly  
K. Otsubo, Y. Wakabayashi, J. Ohara, S. Yamamoto, H. Matsuzaki, H. Okamoto, K. Nitta, T. Uruga, H. Kitagawa  
**Nature Materials**, 10, 291–295 (2011).
- Surface Nano-Architecture of A Metal-Organic Framework  
R. Makiura, S. Motoyama, Y. Umemura, H. Yamanaka, O. Sakata, H. Kitagawa  
**Nature Materials**, 9, 565–571 (2010).
- Size-Controlled Stabilization of the Superionic Phase to Room Temperature in Polymer-Coated AgI Nanoparticles  
R. Makiura, T. Yonemura, T. Yamada, M. Yamauchi, R. Ikeda, H. Kitagawa, K. Kato, M. Takata  
**Nature Materials**, 8, 476–480 (2009).
- Transported into Fuel Cells  
H. Kitagawa  
**Nature Chemistry**, 1, 689–690 (2009).
- Thermochromism in an Organic Crystal Based on the Coexistence of  $\sigma$ - and  $\pi$ -Dimers  
Y. Morita, S. Suzuki, K. Fukui, S. Nakazawa, H. Kitagawa  
**Nature Materials**, 7, 41–51 (2008).