CV

Dr. SATOSHI NIHONYANAGI

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Molecular Spectroscopy Laboratory, RIKEN
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EDUCATIONS;
Degree: Dr. of Science, Hokkaido University (2004)
Thesis:「Sum Frequency Generation Study on Molecular Structures at Solid/Liquid Interfaces」

1999 Apr.- 2004 Mar., Division of Chemistry, Graduate School of Science, Hokkaido University. Advisor: Prof. Kohei Uosaki

1995 Apr.-1999 Mar., Division of Chemistry, Faculty of Science, Hokkaido University.

WORK EXPERIENCES;
2023 Jul.- 2023 Aug.: Part-time Lecturer, Hokkaido University
2022 Aug - 2023 Jul.: Visiting Professor at the Department of Physics, National Chung Hsing University
2016 Apr.-Present : Senior Research Scientist, Molecular Spectroscopy Lab, RIKEN
2014 Oct.-Present : Part-time Lecturer, Saitama University
2014 Oct.-2016 Mar. : Research Scientist, Molecular Spectroscopy Lab, RIKEN
2012 Oct.-2016 Mar. : PREST Researcher, JST
2012 Apr.-2014 Sep. : Research Scientist (fixed-term), Molecular Spectroscopy Lab, RIKEN
2011 Feb.-2012 Mar. : ASI Research Scientist, Molecular Spectroscopy Lab, RIKEN
2010 Apr.- 2011 Jan. : Postdoctoral Researcher, Molecular Spectroscopy Lab, RIKEN
2007 Apr.-2010 Mar. : Special Postdoctoral Researcher, Molecular Spectroscopy Lab, RIKEN
2004 Aug.-2007 Jan.: Postdoctoral Associate in Borguet research lab, Temple University
2004 Feb.-2004 Jul. : Postdoctoral Associate in Borguet research lab, Univ. of Pittsburgh
2002 Apr. -2004 Mar.: Japan Society of Promotion of Science (JSPS) fellowship
2001 Nov.-2001 Dec.: Researcher Abroad at Facultes Universitaires Notre-Dame de la Paix, Namur, Belgium (For collaboration with Dr. Andre Peremans)
2001 April- 2001 Sep.: Teaching Assistant, Department of Science, Hokkaido Univ.

RESEARCH INTERESTS;

1. Interface-selective nonlinear spectroscopy
2. Structure and dynamics of water at interfaces
3. Interface sciences
4. Electrochemistry

LIST OF AWARDS

1. MORINO Foundation for Molecular Science (Aug. 2013)
2. RIKEN Significant Achievement Award (Mar. 2013)
3. The Spectroscopical Society of Japan Award for Young Scientists (Nov. 2012)
4. Young Scientist Awards of the Japan Society for Molecular Science (Sep. 2012)
5. RIKEN Research Incentive Award (Mar. 2012)
6. PCCP poster prize at the International Conference on Electrified Interfaces (Jun. 2007)

Academic activity

[Societies]

The Chemical Society of Japan, Japan Society for Molecular Science, The Japan Society of Vacuum and Surface Science, The Society of Polymer Science, Japan, The Spectroscopical Society of Japan

[Activities]

The editorial board of the Journal of Japan Society for Molecular Science “Molecular Science”.

Steering Committee of Scientist’s Assembly in RIKEN.

[Peer reviews]

Physical Review Letters, Angew. Chem. Int. Ed., Chem. Sci., J. Phys. Chem. Lett., J. Phys. Chem. C, Langmuir, J. Chem. Phys., Phys. Chem. Chem. Phys., Macromolecules, ChemElectroChem, Front. Chem., Appl. Phys. Express, Chem. Lett., Chem. Select, etc.

LIST OF PUBLICATIONS
[Original papers]

1. Origin of Solvent Stabilization at Super-concentrated Electrolyte/Electrode Interfaces Revealed by Heterodyne-detected Vibrational Sum Frequency Generation Spectroscopy
   A. Sayama, **S. Nihonyanagi***, Y. Ohshima and T. Tahara*
   J. Phys. Chem. C, 127 (2023) 10524-10531.
2. Adsorption of SARS-CoV-2 Spike (N501Y) RBD to Human Angiotensin-Converting Enzyme 2 at a Lipid/Water Interface"
   R. Harison, **S. Nihonyanagi**, A. Myalitsin, S. Roy, M. Ahmed, T. Tahara, I. Rzeznicka
   J. Phys. Chem. B, 127 (2023) 4406-4414.
3. Elucidation of pH-Dependent Electric Double Layer Structure at the Silica/Water Interface Using Heterodyne-Detected Vibrational Sum Frequency Generation Spectroscopy
   F. Wei, S. Urashima, **S. Nihonyanagi**, T. Tahara
   J. Am. Chem. Soc. 145 (2023) 8833-8846.
4. "Ultrafast vibrational dynamics of the free OD at the air/water interface: Negligible isotopic dilution effect but large isotope substitution effect"
   M. Ahmed, **S. Nihonyanagi**, and T. Tahara*
   J. Chem. Phys. 156 (2022) 224701. (Front Cover)
5. "DNA-Induced Reorganization of Water at Model Membrane Interfaces Investigated by Heterodyne-Detected Vibrational Sum Frequency Generation Spectroscopy"
   P. C. Singh, M. Ahmed, **S. Nihonyanagi***, S. Yamaguchi, and T. Tahara*
   J. Phys. Chem. B 126 (2022) 840−846.
6. "The photochemical reaction of phenol becomes ultrafast at the air-water interface"
   R. Kusaka, **S. Nihonyanagi**, T. Tahara
   Nat. Chem. 13 (2021) 306-311. **(Front Cover)**
7. "Resolving the Controversy over Dipole versus Quadrupole Mechanism of Bend Vibration of Water in Vibrational Sum Frequency Generation Spectra"
   M. Ahmed, **S. Nihonyanagi**, A. Kundu, S. Yamaguchi, and T. Tahara
   J. Phys. Chem. Lett. 11 (2020) 9123-9130.
8. "Diffusive reorientation-induced relaxation of free OH at the air/water interface revealed by time-resolved HD-VSFG spectroscopy"
   K. Inoue, M. Ahmed, **S. Nihonyanagi**, and T. Tahara
   Nat. Commun. 11 (2020) 5344.
9. "Molecular Structure of Water and Polymer at the Buried Polymer/Water Interface Unveiled by Heterodyne-Detected Vibrational Sum Frequency Generation"
   A. Myalitsin, S. Ghosh, S. Urashima, **S. Nihonyanagi**, S. Yamaguchi, T. Aoki, and T. Tahara
   Phys. Chem. Chem. Phys. 22 (2020) 16527-16531.

10. “Comment on "Phase-Sensitive Sum Frequency Vibrational Spectroscopic Study of Air/Water Interfaces: H_2O, D_2O, and Diluted Isotopic Mixtures" [J. Chem. Phys. 150, 144701 (2019)]”
M. Ahmed, Y. Nojima, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
J. Chem. Phys. 152 (2020) 237101.
11. “Hidden Isolated OH at the Charged Hydrophobic Interface Revealed by Two-Dimensional Heterodyne-Detected VSFG Spectroscopy,”
M. Ahmed, K. Inoue, **S. Nihonyanagi**, and T. Tahara,
***Angew. Chem. Int. Ed*.** 59 (2020) 9498-9505.
12. “Preferred Orientations of Organic Cations at Lead-Halide Perovskite Interfaces Revealed by Vibrational Sum-Frequency Spectroscopy”
W. Sung, C. Müller, S. Hietzschold, R. Lovrinčić, N. P. Gallop, A. A. Bakulin, **S. Nihonyanagi**, and T. Tahara,
Mater. Horiz. 7 (2020) 1348-1357.
13. “In-Situ Observation of Potential-Dependent Structure of Electrolyte/Electrode Interface by Heterodyne-Detected Vibrational Sum Frequency Generation”
A. Sayama, **S. Nihonyanagi**,* Y. Ohshima and T. Tahara*
Phys. Chem. Chem. Phys. 22 (2020) 2850-2589.
14. “I*n-Situ* Referencing Method for Heterodyne-Detected Vibrational Sum Frequency Generation Measurements at Metal Electrode Interfaces”
S. Nihonyanagi,* A. Sayama, Y. Ohshima and T. Tahara*
Chem. Lett. 48 (2019) 1387-1390.
15. “Quadrupolar Mechanism for Vibrational Sum Frequency Generation at Air/Liquid Interfaces: Theory and Experiment”
K. Matsuzaki, **S. Nihonyanagi**, S. Yamaguchi, T. Nagata, and T. Tahara
J. Chem. Phys.151 (2019) 064701.
16. “Effect of Frequency-Dependent Fresnel Factor on the Vibrational Sum Frequency Generation Spectra for Liquid/Solid Interfaces”
L. Wang, **S. Nihonyanagi***, K. Inoue, K. Nishikawa, A. Morita*, S. Ye and T. Tahara
J. Phys. Chem. C 123 (2019) 15665.
17. “Effect of Hydrogen-Bond on Ultrafast Spectral Diffusion Dynamics of Water at Charged Monolayer Interfaces”
K. Inoue, M. Ahmed, **S. Nihonyanagi**, and T. Tahara
J. Chem*. *Phys. 150 (2019) 054705.
18. “The Topmost Water Structure at a Charged Silica/Aqueous Interface Revealed by Heterodyne-Detected Vibrational Sum Frequency Generation Spectroscopy”
S. Urashima, A. Myalitsin, **S. Nihonyanagi**, and T. Tahara
J. Phys. Chem. Lett. 9 (2018) 4109−4114
19. “Molecular Mechanism of Charge Inversion Revealed by Polar Orientation of Interfacial Water Molecules: A Heterodyne-Detected Vibrational Sum Frequency Generation Study.”
M. Sartin, W. Sung, **S. Nihonyanagi** and T. Tahara
J. Chem. Phys. 149 (2018) 024703

20. “Structure at the Air/Water Interface in the Presence of Phenol: A Study by Heterodyne-Detected Vibrational Sum Frequency Generation and Molecular Dynamics Simulation”
R. Kusaka, T. Ishiyama, **S. Nihonyanagi**, A. Morita, and T. Tahara
Phys. Chem. Chem. Phys. 20 (2018) 3002-3009.
21. “Cooperative Hydrogen-Bond Dynamics at a Zwitterionic Lipid/Water Interface Revealed by 2D HD-VSFG Spectroscopy”
K. Inoue, P. C. Singh, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
***J. Phys. Chem. Lett*.** 8 (2017) 5160−5165
22. “Change of the Isoelectric Point of Hemoglobin at the Air/Water Interface Probed by the Orientational Flip-Flop of Water Molecules”
S. Devineau, K. Inoue, R. Kusaka, S. Urashima, **S. Nihonyanagi**, D. Baigl, A. Tsuneshige, and T. Tahara
***Phys. Chem. Chem. Phys*.** 19 (2017) 10292 -10300.
23. “Water Orientation at Ceramide/Water Interfaces Studied by Heterodyne-Detected Vibrational Sum Frequency Generation Spectroscopy and Molecular Dynamics Simulation”
A. Adhikari, S. Re, W. Nishima, M. Ahmed, **S. Nihonyanagi**, J. B. Klauda, Y. Sugita and T. Tahara
J. Phys. Chem. C, 120 (2016) 23692 −23697.
24. “Femtosecond Hydrogen-Bond Dynamics of Bulk-like and Bound Water at Positively and Negatively Charged Lipid Interfaces Revealed by 2D HD-VSFG Spectroscopy.”
P. C. Singh, K. Inoue, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
Angew. Chem. Int. Ed., 55 (2016) 10621−10625.
25. “Bend Vibration of Surface Water Investigated by Heterodyne-Detected Sum Frequency Generation and Theoretical Study: Dominant Role of Quadrupole.”
A. Kundu, T. Ishiyama, M. Ahmed, K. Inoue, S. Tanaka, **S. Nihonyanagi**, H. Sawai, S. Yamaguchi, A. Morita, and T. Tahara
J. Phys. Chem. Lett., 7 (2016) 2597 −2601.
26. “Partially Hydrated Electrons at the Air/Water Interface Observed by UV-Excited Time-Resolved Heterodyne-Detected Vibrational Sum Frequency Generation Spectroscopy”
K. Matsuzaki, R. Kusaka, **S. Nihonyanagi**, S. Yamaguchi, T. Nagata, and T. Tahara
***J. Am. Chem. Soc*.** 138 (2016) 7551−7557.
27. “Water Structure at the Buried Silica/Aqueous Interface Studied by Heterodyne-Detected Vibrational Sum-Frequency Generation”
A. Myalitsin, S. Urashima, **S. Nihonyanagi**, S. Yamaguchi, T. Tahara
J. Phys. Chem. C, 120 (2016) 9357 −9363.
28. “Efficient Spectral Diffusion at the Air/Water Interface Revealed by Femtosecond Time-Resolved Heterodyne-Detected Vibrational Sum Frequency Generation

Spectroscopy."
K. Inoue, T. Ishiyama, **S. Nihonyanagi**, S. Yamaguchi, A. Morita, and T. Tahara
J. Phys. Chem. Lett., 7 (2016) 1811 −1815.

29. "2D Heterodyne-Detected Sum Frequency Generation Study on the Ultrafast Vibrational Dynamics of H_2O and HOD Water at Charged Interfaces"
K. Inoue, **S. Nihonyanagi**, P.C. Singh, S. Yamaguchi, and T. Tahara
J. Chem. Phys. 142 (2015) 212431.
30. "Accurate Determination of Complex $\chi^{(2)}$ Spectrum of the Air/Water Interface."
S. Nihonyanagi, R. Kusaka, K. Inoue, A. Adhikari, S. Yamaguchi, and T. Tahara
J. Chem. Phys., 143 (2015), 124707.
31. "Counterion Effect on Interfacial Water at Charged Interfaces and Its Relevance to the Hofmeister Series"
S. Nihonyanagi, S. Yamaguchi, and T. Tahara
J. Am. Chem. Soc*.** 136 (2014) 6155−6158. (Communication***)
32. "Interfacial Water in the Vicinity of a Positively Charged Interface Studied by Steady-State and Time-Resolved Heterodyne-Detected Vibrational Sum Frequency Generation"
P. C. Singh, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
J. Chem. Phys. 141 (2014) 18C527.
33. "Observation of the Bending Mode of Interfacial Water at Silica Surfaces by Near Infrared Vibrational Sum-frequency Generation Spectroscopy of the [stretch+bend] Combination Bands"
O. Isienko, **S. Nihonyanagi**, D. Sil and E. Borguet
J. Phys. Chem. Lett. 4 (2013) 531−535.
34. "Vibrational Sum Frequency Generation by the Quadrupolar Mechanism at Nonpolar Benzene/Air Interface"
K. Matsuzaki, **S. Nihonyanagi**, S. Yamaguchi, T. Nagata, and T. Tahara
J. Phys. Chem. Lett. 4 (2013) 1654−1658.
35. "Ultrafast Vibrational Dynamics of Hydrogen Bond Network Terminated at the Air/Water Interface: A 2D HD-VSFG Study"
P. Singh†, **S. Nihonyanagi**†, S. Yamaguchi†, T. Tahara (†contributed equally)
***J. Chem. Phys*.** 138 (2013) 161101.
36. "Three Distinct Water Structures at a Zwitterionic Lipid/Water Interface Revealed by Heterodyne-Detected Vibrational Sum Frequency Generation"
J. A. Mondal, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
***J. Am. Chem. Soc*.** 134 (2012) 7842−7850.
37. "Ultrafast Vibrational Dynamics of Charged Aqueous Interfaces by Time-Resolved Heterodyne-Detected Sum Frequency Generation."
S. Nihonyanagi, P. C. Singh, S. Yamaguchi, and T. Tahara
Bull. Chem. Soc. Jpn. 85 (2012) 758−760. **(*Selected paper*)**

38. “Hydrogen Bond Rearrangement of Interfacial Water Studied by Two-Dimensional Heterodyne-Detected Vibrational Sum Frequency Generation”
P. C. Singh, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
***J. Chem. Phys*.** 137 (2012) 094706.
39. “Spectroscopy and Dynamics of the Multiple Free OH Species at an Aqueous/Hydrophobic Interface”
A. Eftekhari-Bafrooei, **S. Nihonyanagi** and E. Borguet
J. Phys*. *Chem. *C* 116 (2012) 21734−21741.
40. “Ultrafast Vibrational Dynamics and Spectroscopy of a Siloxane Self-Assembled Monolayer”
S. Nihonyanagi, A. Eftekhari-Bafrooei, and E. Borguet
J. Chem. Phys. 134 (2011) 84701.
41. “Unified Molecular View of Air/Water Interface Based on Experimental and Theoretical $\chi^{(2)}$ Spectra of Isotopically Diluted Water Surface.”
S. Nihonyanagi, T. Ishiyama, T. Lee, S. Yamaguchi, M. Bonn, A. Morita, and T. Tahara
***J. Am. Chem. Soc*.** 133 (2011) 16875–16880**.**
42. “Linking Surface Potential and Deprotonation in Nanoporous Silica: Second Harmonic Generation and Acid/Base Titration”
R. K. Campen, A. Pymer, **S. Nihonyanagi**, and E. Borguet
J. Phys. Chem. C 114 (2010) 18465–18473.
43. “Interfacial Molecular Structures of Polyelectrolyte Brush in Contact with Dry Nitrogen, Water Vapor, Liquid Water, and Aqueous Electrolyte Solution Studied by Sum Frequency Generation Spectroscopy”
K. Uosaki, H. Noguchi, R. Yamamoto, and **S. Nihonyanagi**
***J. Am. Chem. Soc*.** 132 (2010) 17271–17276.
44. “Structure and Orientation of Water at Charged Lipid Monolayer/Water Interfaces Probed by Heterodyne-detected Vibrational Sum Frequency Generation Spectroscopy”
J. A. Mondal, **S. Nihonyanagi**, S. Yamaguchi, and T. Tahara
J. Am. Chem. Soc. 132 (2010) 10656–10657. (***Communication***)
45. “Water Hydrogen Bond Structure Near Highly Charged Interfaces is NOT Like Ice”
S. Nihonyanagi, S. Yamaguchi, and T. Tahara
J. Am. Chem. Soc. 132 (2010) 6867–6869. (***Communication***)
46. “Direct Evidence for Orientational Flip-Flop of Water Molecules at Charged Interfaces: A Heterodyne-Detected Vibrational Sum Frequency Generation Study”
S. Nihonyanagi, S. Yamaguchi, and T. Tahara
J. Chem. Phys. 130 (2009) 204704.
47. “Self-Assembled Monolayer Compatible with Metal Surface Acoustic Wave Devices on Lithium Niobate”

S. Nihonyanagi, A. Eftekhari-Bafrooi, J. Hines, and E. Borguet
Langmuir 24 (2008) 5161-5165.

48. "Decomposition Processes of an Organic Monolayer Formed on Si(111) via a Silicon-Carbon Bond Induced by Exposure to UV Irradiation or Ozone"
K. Uosaki, M. E. Quayum, **S. Nihonyanagi**, and T. Kondo
Langmuir 20 (2004) 1207-1212.

49. "Evidence for Epitaxial Arrangement and High Conformational Ordered of Organic Monolayer on Si(111) by Sum Frequency Generation (SFG) Study"
S. Nihonyanagi, D. Miyamoto, S. Idojiri, T. Kondo and K. Uosaki
J. Am. Chem. Soc. 126 (2004) 7034-7040.

50. "Potential Dependent Structure of the Interfacial Water on the Gold Electrode"
S. Nihonyanagi, S. Ye, K. Uosaki, C. Humbert, L. Dreesen, A. Mani, P. A. Thiry and A. Peremans
Surf. Sci. 576 (2004) 11–16.

51. "Interfacial Water Structure at As-Prepared and UV-Induced Hydrophilic TiO2 Surfaces Studied by Sum Frequency Generation Spectroscopy and Quartz Crystal Microbalance"
K. Uosaki, T. Yano and **S. Nihonyanagi**
J. Phys. Chem. B 108 (2004) 19086-19088.

52. "Probing a Molecular Electronic Transition by Two-Color Sum-Frequency Generation Spectroscopy"
C. Humbert, L. Dreesen, **S. Nihonyanagi**, T. Masuda, T. Kondo, A. Mani, K. Uosaki P. A. Thiry and A. Peremans
Appl. Surf. Sci. 212-213 (2003) 797-803.

53. "Formation of Organic Monolayer on Hydrogen Terminated Si(111) Surface via Silicon-Carbon Bond Monitored by ATR FT-IR and SFG Spectroscopy: Effect of Orientational Order on the Reaction Rate"
M. E. Quayum, T. Kondo, **S. Nihonyanagi**, D. Miyamoto and K. Uosaki
Chem. Lett. (2002) 208-209.

54. "Conformational Order of Octadecanethiol (ODT) Monolayer at Gold / Solution Interface: Internal Reflection Sum Frequency Generation (SFG) Study"
S. Ye, **S. Nihonyanagi**, K. Fujishima and K. Uosaki
Stud. Surf. Sci. Catal. 132 (2001) 705-710.

55. "Orientation and Stability of Hydrogen Termination on Si(111) Surface Studied by Sum-Frequency Generation (SFG)"
S. Ye, T. Saito, **S. Nihonyanagi**, K. Uosaki, P. B. Miranda, D. Kim and Y. R. Shen
Surf. Sci. 476 (2001) 121-128.

56. "Sum Frequency Generation (SFG) Study on the Molecular Structures at the Interfaces between Quartz Modified with Amino-terminated Self-assembled Monolayer and Electrolyte Solutions of Various pH and Ionic Strength"
S. Nihonyanagi, S. Ye and K. Uosaki
Electrochim. Acta 46 (2001) 3057-3061.

57. “Sum Frequency Generation (SFG) Study of the pH Dependent Water Structure on the Fused Quartz Surface Modified by Octadecyltrichlorosilane (OTS) Monolayer”
S. Ye, **S. Nihonyanagi** and K. Uosaki
Phys. Chem. Chem. Phys. 3 (2001) 3463-3469.

58. “Sum Frequency Generation (SFG) Studies on the Conformational Order of the Self-Assembled Monolayers of Alkanethiols on Silver Surface”
S. Ye, K. Shimazu, **S. Nihonyanagi** and K. Uosaki
Molecular Crystals and Liquid Crystals Science and Technology Section B: Nonlinear Optics 24 (2000) 93-98.

59. “pH-Dependent Water Structure at a Quartz Surface Modified with an Amino-terminated Monolayer Studied by Sum-Frequency Generation (SFG)”
S. Ye, **S. Nihonyanagi** and K. Uosaki
Chem. Lett. (2000) 734-735.