

Yoshikazu HIRAI

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ResearcherID: G-8730-2011

As of April 7, 2021



PERSONAL INFORMATION

Date of Birth: August, 1979
Place of Birth: Kyoto, JAPAN
Citizenship: JAPAN

RESEARCH INTERESTS

- Micro/Nano fabrication technologies for MEMS/NEMS
- Silicon/Polymer based MEMS devices and systems
- Chip-scale atomic devices
- Microphysiological systems
- Platforms for ion channel recording and single molecule analysis

RESEARCH EXPERIENCE

Assistant Professor

2013 – Present

Department of Micro Engineering, Kyoto University, JAPAN

- Technology, materials, and processes for MEMS/NEMS
 - Process simulation for optical lithography
 - UV lithography for three-dimensional microstructuring (e.g., thick-film resist process, grayscale lithography)
 - Soft-lithography technique for PDMS-based sensor, actuator and device
 - KOH, DRIE for three-dimensional microstructuring
 - Low temperature, wafer level bonding process
- Development of MEMS for applications
 - Chip-scale atomic clock/magnetometer
 - Deformable micro-mirror devices
 - Microphysiological systems (e.g., Organ/Body on a Chips)
 - Microfabricated systems for generation of functional organoids
- Sensor/actuator technologies to embedded in microfluidic devices
 - Pneumatic actuators for precise liquid control
 - High sensitive ionic liquid-based pressure sensor
 - Microelectrode arrays
 - Transepithelial electrical resistance (TEER) measurement
- Platform for characterizations of ion channels
 - Recording conformational changes utilizing the diffracted X-ray tracking method
 - Measuring electrical signals upon gating
 - Artificial cell membrane systems realized by MEMS/microfluidic technologies

Adjunct Assistant Professor

2014 – 2017

Institute for Integrated Cell-Material Sciences (iCeMS), Kyoto University, JAPAN

- Biocompatibility of microfabrication materials
 - Cell adhesion, proliferation, pluripotent status, and gene expression
 - Human pluripotent stem cells (hPSC) behavior with microengineered substrates
- Microfluidic device for biomedical applications
 - Amino Levulinic Acid (ALA)-induced fluorescence detection for cancer cell diagnosis
 - Bladder cancer diagnosis utilizing microfluidic fluorescence-activated cell sorter
 - Heart/Cancer on a chip to reproduce the side effects of drugs

Program Specific Assistant Professor

2009 – 2013

Advanced Biomedical Engineering Research Unit, Kyoto University, JAPAN

- Microfabrication to miniaturize optically pumped atomic magnetometer
 - Glass-frit reflow process for hermetic packaging
 - Producing alkali metal by thermal decomposition at low temperature
- Molecular level study of photoresist materials
 - Coarse-grained molecular dynamics for photoresist materials
 - Measurement of photoresist porosity and mechanical property

Postdoctoral Research Scientist

2007 – 2009

Department of Micro Engineering, Kyoto University, JAPAN

- UV lithography-based microfabrication for microfluidic devices
 - Experimental analysis of photoresist materials
 - Single-step microchannel fabrication realized by Moving-mask lithography
- Optically pumped atomic magnetometer
 - Fabrication of alkali-metal vapor cells utilizing glass working
 - System setup for the high sensitive atomic magnetometer

PhD Research

2004 – 2007

Department of Mechanical Engineering, Kyoto University, JAPAN

- Optical lithography for three-dimensional microstructuring
 - Moving-mask lithography for three-dimensional microfabrication
 - X-ray/UV lithography process simulation
 - Experimental characterizations of thick-film photoresist processing

EDUCATION

Doctor of Philosophy in Mechanical Engineering

March 2007

Kyoto University, JAPAN

Dissertation title: "Study on X-ray and UV Lithography for Three-Dimensional Photoresist Microstructuring" (in Japanese)

Advisor: Professor Dr. Osamu Tabata

Master of Engineering in Mechanical Engineering

March 2004

Ritsumeikan University, JAPAN

Bachelor of Engineering in Mechanical Engineering (Graduated top of the department)

March 2002

Ritsumeikan University, JAPAN

SELECTED AWARDS

The Japan Society of Mechanical Engineers (JSME) Best Presentation Paper Award in the 11th Symposium on Micro-Nano Science and Technology (Micro-Nano Mechanical Science and Technology Division) February 2021

The Japan Society of Mechanical Engineers (JSME) Best Presentation Paper Award in the 2018 JSME Annual Meeting (Micro-Nano Mechanical Science and Technology Division) February 2019

The Institute of Electrical Engineers of Japan (IEEJ) Distinguished Paper Award in 2016 June 2017

The six major results of 2015 from Nanotechnology Platform Japan Program February 2017

The Outstanding Reviewer Awards of Journal of Micromechanics and Microengineering (Institute of Physics, United Kingdom) in 2016 February 2017

The Excellent Technical Paper Award in the 33rd Sensor Symposium on Sensors, Micromachines and Applied Systems (The Sensors and Micromachines Division in The Institute of Electrical Engineers of Japan) October 2016

The Institute of Electrical Engineers of Japan (IEEJ) Excellent Presentation Award in 2015 April 2016

The Igarashi Award in the 32nd Sensor Symposium on Sensors, Micromachines and Applied Systems (The Sensors and Micromachines Division in The Institute of Electrical Engineers of Japan) October 2015

The Hatakeyama Award in 2001 (The Japan Society of Mechanical Engineers) March 2002

ASSOCIATE EDITOR / EDITORIAL BOARD

- IEEE Transactions on Nanotechnology (AE) 2019 – Present
- Sensors and Actuators Reports (EB) 2021 – Present

COMMITTEES OF THE INTERNATIONAL CONFERENCE

- IEEE-NEMS (International Conference on Nano/Micro Engineered and Molecular Systems), Conference Technical Program Committee 2013 – 2015, 2017 – 2021
- IEEE-NEMS (International Conference on Nano/Micro Engineered and Molecular Systems), Local Organizer 2012
- IEEE NMDC (International Conference on Nanotechnology Materials & Devices Conference), Invited Symposia Committee 2012
- IEEE SENSORS, Conference Technical Program Committee 2017, 2018

PROFESSIONAL MEMBERSHIPS

- Japan Society of Mechanical Engineers (JSME) 2002 – Present
- Institute of Electrical Engineers of Japan (IEEJ) 2003 – Present
- Institute of Electrical and Electronic Engineers (IEEE) 2009 – Present
- Materials Research Society (MRS) 2011 – Present
- Society for Chemistry and Micro-Nano Systems (CHEMINAS) 2013 – Present
- Japan Institute of Electronics Packaging (JIEP) 2014 – Present
- Japan Society of Applied Physics (JSAP) 2019 – Present

SCIENTIFIC JOURNALS

(Over 50 papers)

1. Takashi Miyazaki, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, "Design Strategy of Electrode Patterns Based on Finite Element Analysis in Microfluidic Device for Trans-Epithelial Electrical Resistance (TEER) Measurement", *Electr. Commun. Jpn.*, in press
2. Shun Kiyose, **Yoshikazu Hirai**, Osamu Tabata, Toshiyuki Tsuchiya, "Microfabricated Alkali Metal Vapor Cells Filled With an On-Chip Dispensing Component", *Jpn. J. Appl. Phys.*, 60(2021), SCCL01
3. Yuanlin Xia, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, "Fracture behavior of Single-crystal Silicon Microstructure Coated with Stepwise Bias-graded a-C:H Film Surface and Coatings Technology", *Surf. Coat. Technol.*, 405(2021), 126559
4. Koki Yoshimoto, Nicolas Minier, Jiandong Yang, Satoshi Imamura, Kaylene Stocking, Janmesh Patel, Shiho Terada, **Yoshikazu Hirai**, Ken-ichiro Kamei, "Recapitulation of Human Embryonic Heart Beating to Promote Differentiation of Hepatic Endoderm to Hepatoblasts", *Front. Bioeng. Biotechnol.*, 8(2020), 568092
5. Naoki Yamashita, Seongsu Park, Kentaro Kawai, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Surface-Enhanced Raman Spectroscopy with Gold Nanoparticle Dimers Created by Sacrificial DNA Origami Technique", *Micro Nano Lett.*, 15(2020), pp.384–389
6. Jiayu Wu, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, "Novel Microfluidic Device Integrated with a Fluidic-Capacitor to Mimic Heart Beating for Generation of Functional Liver Organoids", *Electr. Commun. Jpn.*, 102(2019), pp.41–49
7. Yunyi Shu, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Geometrical Compensation for Mode-Matching of (100) Silicon Ring Resonator for Vibratory Gyroscope", *Jpn. J. Appl. Phys.*, 58(2019), SDDL06
8. Wenlei Zhang, Kazutaka Obitani, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Fracture Strength of Silicon Torsional Mirror Resonators Fully Coated with Submicrometer-Thick PECVD DLC Film", *Sens. Actuator A-Phys.*, 286(2019), pp.28–34
9. Akiko Uno, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Mathematical Modeling and Analysis of MEMS Deformable Mirror Actuated by Electrostatic Piston Array", *Electr. Eng. Jpn.*, 204(2018), pp.50–60
10. Akio Uesugi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Parallel Tensile Testing of Single-crystal Silicon Microstructures with Integrated Piezoresistive Strain Gauges", *Sens. Mater.*, 30(2018), pp.2143–2157
11. Zhipeng Ma, Yunfei Huang, Seongsu Park, Kentaro Kawai, Do-Nyun Kim, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Hirofumi Yamada, Osamu Tabata, "Rhombic-Shaped Nanostructures and Mechanical Properties of 2D DNA Origami Constructed with Different Crossover/Nick Designs", *Small*, 14(2018), 1702028
12. Toshiyuki Tsuchiya, Tetsuya Hemmi, Jun-ya Suzuki, **Yoshikazu Hirai**, Osamu Tabata, "Tensile Strength of Silicon Nanowires Batch-Fabricated into Electrostatic MEMS Testing Device", *Appl. Sci.*, 8(2018), 880
13. Naoki Yamashita, Zhipeng Ma, Seongsu Park, Kentaro Kawai, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata,

"Formation of Gold Nanoparticle Dimers on Silicon by Sacrificial DNA Origami Technique", *Micro Nano Lett.*, 12(2017), pp.854–859

14. Ken-ichiro Kamei, Yoshiki Kato, **Yoshikazu Hirai**, Shinji Ito, Junko Satoh, Atsuko Oka, Toshiyuki Tsuchiya, Yong Chen, Osamu Tabata, "Integrated Heart/Cancer on a Chip to Reproduce the Side Effects of Anti-Cancer Drugs in vitro", *RSC Adv.*, 7(2017), pp.36777–36786
15. Amit Banerjee, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Measurement and Potential Barrier Evolution Analysis of Cold Field Emission in Fracture Fabricated Si Nanogap", *Jpn. J. Appl. Phys.*, 56(2017), 06GF06
16. Wenlei Zhang, Akio Uesugi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Tensile Test of a Silicon Microstructure Fully Coated with Submicrometer-Thick DLC Film Using PECVD Method", *Jpn. J. Appl. Phys.*, 56(2017), 06GN01
17. Zhipeng Ma, Kentaro Kawai, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Tuning Porosity and Radial Mechanical Properties of DNA Origami Nanotubes via Crossover Design", *Jpn. J. Appl. Phys.*, 56(2017), 06GJ02
18. Kazuhiro Ban, **Yoshikazu Hirai**, Kazuya Tsujimoto, Akira Terao, Natsuhiko Mizutani, Tetsuo Kobayashi, Osamu Tabata, "Characterization of Alkali-Metal Vapor Cells Fabricated with an Alkali-Metal Source Tablet", *J. Vac. Sci. Technol. A*, 34(2016), 061601
19. Zhipeng Ma, Seongsu Park, Naoki Yamashita, Kentaro Kawai, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Constructing Higher Order DNA Origami Arrays using DNA Junctions of Anti-Parallel/Parallel Double Crossovers", *Jpn. J. Appl. Phys.*, 55(2016), 06GL04
20. Zhipeng Ma, Seongsu Park, Naoki Yamashita, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Investigation of the Self-Assembly Process for Discrete and Polymerized Bivalve DNA Origami Structures", *IEEE Trans.*, 11(2016), pp.S164–S170
21. Toshiyuki Tsuchiya, Yusuke Kogita, Akira Taniyama, **Yoshikazu Hirai**, Koji Sugano, Osamu Tabata, "Time-Resolved Micro-Raman Stress Spectroscopy for Single-Crystal Silicon Resonators Using a MEMS Optical Chopper", *J. Microelectromech. Syst.*, 25(2016), pp.188–196
22. **Yoshikazu Hirai**, Daisuke Takagi, Satoshi Anai, Yoshitomo Chihara, Toshiyuki Tsuchiya, Kiyohide Fujimoto, Yoshihiko Hirao, Osamu Tabata, "ALA-Induced Fluorescence Detection with Photoresist-Based Microfluidic Cell Sorter for Bladder Cancer Diagnosis", *Sens. Actuator B-Chem.*, 213(2015), pp.547–557
23. Zhipeng Ma, Young-Joo Kim, Seongsu Park, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Do-Nyun Kim, Osamu Tabata, "Direct Measurement of Transversely Isotropic DNA Nanotube by Force-Distance Curve-Based Atomic Force Microscopy", *Micro Nano Lett.*, 10(2015), pp.513–517
24. Akio Uesugi, **Yoshikazu Hirai**, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "Effect of Crystallographic Orientation on Tensile Fractures of (100) and (110) Silicon Microstructures Fabricated from SOI Wafers", *Micro Nano Lett.*, 10(2015), pp.678–682
25. Xiaoxu Ma, Yoshiki Kato, Floris van Kempen, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Fred van Keulen, Osamu Tabata, "Experimental Study of Numerical Optimization for 3-D Microstructuring using DMD-Based Grayscale Lithography", *J. Microelectromech. Syst.*, 24(2015), pp.1856–1867
26. Akio Uesugi, Takahiro Yasutomi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "High-Temperature Tensile Testing Machine for Investigation of Brittle-Ductile Transition Behavior of Single Crystal Silicon Microstructure", *Jpn. J. Appl. Phys.*, 54(2015), 06FP04
27. Kazuya Tsujimoto, **Yoshikazu Hirai**, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "Analytical Investigation of the Feasibility of Sacrificial Microchannel Sealing for Chip-Scale Atomic Magnetometers", *Microsyst. Technol.*, 20(2014), pp.357–365
28. Kazuya Tsujimoto, Kazuhiro Ban, **Yoshikazu Hirai**, Koji Sugano, Toshiyuki Tsuchiya, Natsuhiko Mizutani, Osamu Tabata, "On-Chip Fabrication of Alkali-Metal Vapor Cells utilizing an Alkali-Metal Source Tablet", *J. Microeng. Microeng.*, 23(2013), 115003
29. Ken-ichiro Kamei, **Yoshikazu Hirai**, Momoko Yoshioka, Yoshihide Makino, Qinghua Yuan, Minako Nakajima, Yong Chen, Osamu Tabata, "Phenotypic and Transcriptional Modulation of Human Pluripotent Stem Cells Induced by Nano/Microfabrication Materials", *Adv. Healthc. Mater.*, 2(2013), pp.287–291 (Selected as Inside Front Cover)
30. Hiromasa Yagyu, **Yoshikazu Hirai**, Akio Uesugi, Yoshihide Makino, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "Simulation of Mechanical Properties of Epoxy-Based Chemically Amplified Resist by Coarse-Grained Molecular Dynamics", *Polymer*, 53(2012), pp.4834–4842
31. **Yoshikazu Hirai**, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "A Three-Dimensional Microstructuring Technique Exploiting the Positive Photoresist Property", *J. Microeng. Microeng.*, 20(2010), 065005
32. **Yoshikazu Hirai**, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "Embedded Microstructure Fabrication using Developer-Permeability of Semi-Cross-Linked Negative Resist", *J. Microelectromech. Syst.*, 19(2010), pp.1058–1069
33. **Yoshikazu Hirai**, Yoshiteru Inamoto, Koji Sugano, Toshiyuki Tsuchiya, Osamu Tabata, "Moving Mask UV Lithography

for Three-Dimensional Structuring”, *J. Micromech. Microeng.*, 17(2007), pp.199–206

34. **Yoshikazu Hirai**, Sadik Hafizovic, Naoki Matsuzuka, Jan G. Korvink, Osamu Tabata, “Validation of X-ray Lithography and Development Simulation System for Moving Mask Deep X-ray Lithography”, *J. Microelectromech. Syst.*, 15(2006), pp.159–168
35. Naoki Matsuzuka, **Yoshikazu Hirai**, Osamu Tabata, “A Novel Fabrication Process of 3D Microstructures by Double Exposure in Deep X-ray Lithography (D²XL)”, *J. Micromech. Microeng.*, 15(2005), pp.2056–2062

REVIEWS (LISTED IN *Web of Science*)

1. Ken-ichiro Kamei, **Yoshikazu Hirai**, Osamu Tabata, “Body on a Chip: Re-Creation of a Living System In Vitro”, *IEEE Nanotechnology Magazine*, 7(2013), pp.6–14 (Selected as Front Cover)

BOOKS

1. Jan G. Korvink, Sadik Hafizovic, **Yoshikazu Hirai**, Pascal Meyer, “Exposure and Development Simulation for Deep X-ray LIGA”, *Advanced Micro and Nanosystems (Volume. 7): LIGA and Its Applications*, Eds. V. Saile et al, Weinheim: Wiley-VCH, 2009, pp.103–142

INTERNATIONAL CONFERENCE PRESENTATIONS

(Over 140 presentations)

ORAL AND POSTER PRESENTATIONS (LISTED IN *Web of Science* AND *IEEE Xplore*)

1. Takashi Miyazaki, Jiandong Yang, Satoshi Imamura, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, “Highly Accurate Measurement of Trans-Epithelial Electrical Resistance in Organ-on-a-Chip”, The 34th IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2021), Online (January, 2021), pp.411–414
2. Jiandong Yang, **Yoshikazu Hirai**, Ken-ichiro Kamei, Marika Trumm, Toshiyuki Tsuchiya, Osamu Tabata, “In Vitro Modeling of Non-Alcoholic Fatty Liver Disease by Integrated Gut-Liver on a Chip”, The 2020 MRS Spring/Fall Meeting and Exhibit, Online (December, 2020), S.SM01.02.02
3. Dongxiao Zhang, **Yoshikazu Hirai**, Ken-ichiro Kamei, Osamu Tabata, Toshiyuki Tsuchiya, “Heart-Liver on a Chip Integrated with a Microelectrode Array to Monitor Extracellular Field Potentials of Cardiomyocytes”, The 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2020), Online (October 2020), pp.941–942
4. Yunyi Shu, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, “Scale-Factor Analysis of a Geometrically Compensated (100) Single-Crystal Silicon Vibratory Ring Gyroscope”, The 7th IEEE International Symposium on Inertial Sensors and Systems (IEEE INERTIAL 2020), Hiroshima, Japan, (March, 2020)
5. Tomoya Nakamura, **Yoshikazu Hirai**, Osamu Tabata, Toshiyuki Tsuchiya, “Electrostatic Micro Mirror Array with Batch-Fabricated Torsion Beam of Silicon Nanowire”, The 33rd IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2020), Vancouver, Canada (January 2020), pp.1157–1160
6. Jiandong Yang, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, “Integrated Gut-Liver on a Chip for Modelling Non-Alcoholic Fatty Liver Disease in vitro”, The 23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2019), Basel, Switzerland (October 2019), pp.376–377
7. Masaki Shimofuri, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Temperature Difference Measurement Across MEMS Based Nanogap Created by Cleavage of Silicon for Thermionic Generation”, The 20th International Conference on Solid-State Sensors Actuators and Microsystems (Transducers’19), Berlin, Germany (June, 2019), pp.1483–1486
8. Ikkei Yamauchi, Tomoki Tabuchi, **Yoshikazu Hirai**, Masayuki Iwamoto, Toshiyuki Tsuchiya, Hirofumi Shimizu, Osamu Tabata, “Microfabricated Solution Chamber for High Resolution Diffracted X-ray Tracking Method to Observe Ion-Channel Gating Motions”, The 20th International Conference on Solid-State Sensors Actuators and Microsystems (Transducers’19), Berlin, Germany (June, 2019), pp.25–28
9. Katsuo Nakamura, Yuichi Kimoto, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Microfabrication of Alkali Vapor Cells with Lower the Outgassing and Temperature Utilizing Silicon 3D Structure”, The 32nd IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2019), Seoul, Korea (January, 2019), pp.350–353
10. Masaki Shimofuri, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Non-Contact Temperature Difference Measurement of Cleavage Plane Nanogap Electrodes with Large Surface Area”, The 2018 MRS Fall Meeting and Exhibit, Boston, MA USA (November, 2018), TP02.07.04
11. Yusuke Tsuji, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, “Improvement Performance of Ionic Liquid-Based Pressure Sensor for Integration Into Body-on-a-Chip”, The 2018 MRS Fall Meeting and Exhibit, Boston, MA USA (November, 2018), BM05.06.03

12. Jiayu Wu, **Yoshikazu Hirai**, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, “Fluidic-Capacitor Integrated Microfluidic Platform to Mimic Heart Beating for Generation of Functional Liver Organoids”, The 22nd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2018), Kaohsiung, Taiwan (November 2018), pp.1718–1821
13. **Yoshikazu Hirai**, Yasuaki Mori, Tomoki Tabuchi, Hirofumi Shimizu, Toshiyuki Tsuchiya, Osamu Tabata, “Microchannel Fabrication using a Photo Patternable Adhesive Material for Recording Conformational Changes of KcsA Channel with the Diffracted X-ray Tracking Method”, The EUROSENSORS 2018, Graz, Austria (September 2018), 972
14. Amit Banerjee, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Vacuum Emission in Large-Area Nanogap Fabricated by MEMS Controlled Cleavage of Single Crystal Silicon”, The 31st International Vacuum Nanoelectronics Conference (IVNC 2018), Kyoto, Japan (July 2018), O9-2
15. **Yoshikazu Hirai**, Katsuo Nakamura, Yuichi Kimoto, Toshiyuki Tsuchiya, Osamu Tabata, “Alkali Metal Dispenser Utilizing Scalped Silicon Groove for Microfabricated Vapor Cells”, The 2018 IEEE International Frequency Control Symposium (IEEE IFCS 2018), Olympic Valley, CA USA (May, 2018), ThP27
16. Shu Yunyi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Geometrical Compensation of (100) Single-Crystal Silicon Mode-Matched Vibratory Ring Gyroscope”, The 5th IEEE International Symposium on Inertial Sensors and Systems (INERTIAL 2018), Lake Como, Italy (March, 2018), P1-14
17. Akiko Uno, **Yoshikazu Hirai**, Osamu Tabata, Toshiyuki Tsuchiya, “Zernike Generation with MEMS Deformable Mirror Actuated by Electrostatic Piston Array”, The 31st IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2018), Belfast, United Kingdom (January, 2018), pp.704–707
18. **Yoshikazu Hirai**, Yusuke Tsuji, Ken-ichiro Kamei, Toshiyuki Tsuchiya, Osamu Tabata, “Improved Sensitivity of Ionic Liquid-Based Pressure Sensor for Body-on-a-Chip using Simulation-Based 3D Lithography”, The 31st IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2018), Belfast, United Kingdom (January, 2018), pp.511–514
19. Wenlei Zhang, Akio Uesugi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Tensile Properties of Single Crystal Silicon Microstructure Fully-Coated by Plasma CVD Diamond-Like Carbon with Different Substrate Bias Voltages”, The 2017 MRS Fall Meeting and Exhibit, Boston, MA USA (November, 2017), EM06.05.04
20. Amit Banerjee, Yasuaki Mori, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “A MEMS Based Approach for Fabricating Conformal Nanogap Electrodes for Thermotunneling Energy Harvesting Applications”, The 2017 MRS Fall Meeting and Exhibit, Boston, MA USA (November, 2017), ES09.03.28
21. Tatsuya Omaki, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Microfabrication of Embedding a Flexible Polyethylene-Based Microelectrode Array within Body-on-a-Chip”, The EUROSENSORS 2017, Paris, France (September, 2017), T-MN-305-1153
22. Kenta Terashima, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Microfabrication of Cs-Filled MEMS Cell Using Sequential Plasma Activated Bonding”, The 31st European Frequency and Time Forum and the 71st consecutive meeting of the IEEE International Frequency Control Symposium (EFTF-IFCS 2017), Besançon, France (July, 2017), pp.60–62
23. **Yoshikazu Hirai**, Kenta Terashima, Katsuo Nakamura, Toshiyuki Tsuchiya, Osamu Tabata, “Low Temperature, Wafer-Level Process of Alkali-Metal Vapor Cells for Micro-Fabricated Atomic Clocks”, The 19th International Conference on Solid-State Sensors Actuators and Microsystems (Transducers 2017), Kaohsiung, Taiwan (June, 2017), pp.431–434
24. Toshiyuki Tsuchiya, Yuki Matsui, **Yoshikazu Hirai**, Osamu Tabata, “Thermomechanical Noise of Arrayed Capacitive Accelerometers with 300-nm Gap Sensing Electrodes”, The 19th International Conference on Solid-State Sensors Actuators and Microsystems (Transducers 2017), Kaohsiung, Taiwan (June, 2017), pp.1002–1005
25. Amit Banerjee, **Yoshikazu Hirai**, Toshiyuki Tsuchiya and Osamu Tabata, “MEMS based fabrication of conformal electrode pairs for thermotunneling cooling”, The 2017 International Meeting for Future of Electron Devices, Kansai (IMFEDK 2017), Kyoto, Japan (June, 2017), pp.106–107
26. Naoki Yamashita, Zhipeng Ma, Seongsu Park, Kentaro Kawai, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Formation of Gold Nanoparticle Dimers on Silicon by Sacrificial DNA Origami Technique”, The 12th IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS 2017), Los Angeles, CA USA (April, 2017), pp.710–713
27. Wenlei Zhang, Akio Uesugi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, “Tensile Properties of Single-Crystal-Silicon Fully Coated with Submicrometer-Thick PECVD DLC”, The 30th IEEE International Conference on Micro Electro Mechanical Systems (IEEE MEMS 2017), Las Vegas, NV USA (January, 2017), pp.732–735
28. Katsuo Nakamura, Florian Larramendy, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Oliver Paul, Osamu Tabata, “Simulation Study of SU-8 Structures Realized by Single-Step Projection Photolithography”, IEEE Sensors 2016, Orlando, FL USA (October, 2016), pp.139–141

29. Kio Tahara, **Yoshikazu Hirai**, Hirofumi Shimizu, Toshiyuki Tsuchiya, Osamu Tabata, "Photoresist Micro-Chamber for the Diffracted X-ray Tracking Method Recording Single-Molecule Conformational Changes", The EUROSENSORS 2016, Budapest, Hungary (September, 2016), pp.1394-1397
30. Akiko Uno, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "MEMS Deformable Mirror Actuated By Electrostatic Piston Array", The IEEE 2016 International Conference on Optical MEMS and Nanophotonics (OMN2016), Singapore (July, 2016), pp.55-56
31. Toshiyuki Tsuchiya, Tetsuya Hemmi, Jun-ya Suzuki, **Yoshikazu Hirai**, Osamu Tabata, "Tensile Fracture of Integrated Single-Crystal Silicon Nanowire using MEMS Electrostatic Testing Device", The 21st European Conference on Fracture (ECF21), Catania, Italy (June, 2016), pp.1405-1412
32. Akio Uesugi, **Yoshikazu Hirai**, Toshiyuki Tsuchiya, Osamu Tabata, "Effect of Crystallographic Orientations on Fractures and Slip Occurrences at 500 °C of (110) Single Crystal Silicon Microstructures", The 21st European Conference on Fracture (ECF21), Catania, Italy (June, 2016), pp.1413-1420
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