

Shinya Sakuma

Education and Carriers

2007.4 – 2009.3 Master of Science

Department of Biorobotics, Graduate School of Engineering, Tohoku University, JAPAN

2011.4 - 2013.3 Ph. D. of Engineering

Department of Micro-Nano System Engineering, Graduate School of Engineering, Nagoya University, JAPAN

2013.4 – 2014.3 Postdoctoral fellow

Department of Mechanical Engineering, Graduate School of Engineering, Osaka University, JAPAN

2014.4 – 2016.3 Assistant Professor

Institute of Innovation for Future Society, Nagoya University, JAPAN

2016.4 – Assistant Professor

Department of Micro-Nano System Engineering, Graduate School of Engineering, Nagoya University, JAPAN

Other Carriers

2009.4 – 2011.3 Researcher and Developer in Terumo Corporation, JAPAN

2012.4 – 2014.3 Research Fellowship for Young Scientists,

Japan Society for the Promotion of Science (JSPS)

Publication List (Selected Journals)

1. **Shinya Sakuma**, Ayaka Sato, Nobuhiko Kojima, Fumiya Tao, and Fumihito Arai, “Force sensor probe using quartz crystal resonator with wide measurement range for mechanical characterization of HepG2 spheroid”, *Sensors and Actuators A*, 265, 202–210 (2017).
2. **Shinya Sakuma**, Yusuke Kasai, Takeshi Hayakawa, and Fumihito Arai, “On-chip cell sorting by high-speed local-flow control using dual membrane pumps”, *Lab Chip*, 17, 2760–2767 (2017).
3. Utako Yokoyama, Yuta Tonooka, Ryoma Koretake, Taisuke Akimoto, Yuki Gonda, Junichi Saito, Masanari Umemura, Takayuki Fujita, **Shinya Sakuma**, Fumihito Arai, Makoto Kaneko, and Yoshihiro Ishikawa, “Arterial graft with elastic layer structure grown from cells”, *Scientific Reports*, 7, Article number: 140 (2017).
4. Hiroaki Ito, Ryo Murakami, **Shinya Sakuma**, Chia-Hung Dylan Tsai, Thomas Gutschmann, Klaus Brandenburg, Johannes M. B. Pöschl, Fumihito Arai, Makoto Kaneko, and Motomu Tanaka, “Mechanical diagnosis of human erythrocytes by ultra-high speed manipulation unraveled critical time window for global cytoskeletal remodeling”, *Scientific Reports*, 7, Article number: 43134 (2017).
5. Yuichi Murozaki, **Shinya Sakuma**, and Fumihito Arai, “Improvement of the Measurement Range and Temperature Characteristics of a Load Sensor Using a Quartz Crystal Resonator with All Crystal Layer Components”, *Sensors*, 17(5), Article number:1067 (2017).
6. Hiroataka Sugiura, **Shinya Sakuma**, Makoto Kaneko, and Fumihito Arai, “Large indentation method to measure elasticity of cell in robot-integrated microfluidic chip”, *IEEE Robotics and Automation Letters*, 2(4), 2002-2007 (2017).

7. Keitaro Ito, **Shinya Sakuma**, Masaki Kimura, Takanori Takebe, Makoto Kaneko, and Fumihito Arai, "Temporal transition of mechanical characteristics of HUVEC/MSC spheroids using a microfluidic chip with force sensor probes", *Micromachines*, 7(12), 221 (2016).
8. Ryo Murakami, Chia-Hung Dylan Tsai, Makoto Kaneko, **Shinya Sakuma**, and Fumihito Arai, "Cell pinball: phenomenon and mechanism of inertia-like cell motion in a microfluidic channel", *Lab on a Chip*, 15, 3307-3313 (2015).
9. Hirotaka Sugiura, **Shinya Sakuma**, Makoto Kaneko, and Fumihito Arai, "On-chip method to measure mechanical characteristics of a single cell by using moiré fringe", *Micromachines*, 6(6), 660-673 (2015).
10. Kou Nakahara, **Shinya Sakuma**, Takeshi Hayakawa, and Fumihito Arai, "On-chip transportation and measurement of mechanical characteristics of oocytes in an open environment", *Micromachines*, 6(5), 648-659 (2015).
11. Takeshi Hayakawa, **Shinya Sakuma**, and Fumihito Arai, "On-chip 3D rotation of oocyte based on a vibration-induced local whirling flow", *Microsystems & Nanoengineering*, 1, Article number: 15001 (2015).
12. Takumi Monzawa, Makoto Kaneko, Chia-Hung Dylan Tsai, **Shinya Sakuma**, and Fumihito Arai, "On-chip actuation transmitter for enhancing the dynamic response of cell manipulation using a macro-scale pump", *Biomicrofluids*, 9, Article number: 014114 (2015).
13. Tubasa Kakio, Hirotaka Sugiura, **Shinya Sakuma**, Makoto Kaneko, and Fumihito Arai, "On-chip Cellular Force Measurement Using Direct-outer-drive Mechanism", *Transactions of the Society of Instrument and Control Engineers*, 51(1), 2-7 (2015), in Japanese.
14. **Shinya Sakuma**, Keisuke Kuroda, Fumihito Arai, Tatsunori Taniguchi, Tomohito Ohtani, Yasushi Sakata, Makoto Kaneko, "High resolution cell positioning based on a flow reduction mechanism for enhancing deformability mapping", *Micromachines*, 5(4), 1188-1201 (2014).
15. Chia-Hung Dylan Tsai, Shinya Sakuma, Fumihito Arai, Tatsunori Taniguchi, Tomohito Ohtani, Yasushi Sakata, and Makoto Kaneko, "Geometrical alignment for improving cell evaluation in a microchannel with application on multiple myeloma red blood cells", *RSC Advances*, 84(4), 45050-45058 (2014).
16. Takeshi Hayakawa, **Shinya Sakuma**, Takeshi Fukuhara, Yoshiyuki Yokoyama, and Fumihito Arai, "A single cell extraction chip using vibration-induced whirling flow and a thermo-responsive gel pattern", *Micromachines*, 5(3), 681-696 (2014).
17. Keitaro Ito, **Shinya Sakuma**, Yoshiyuki Yokoyama, and Fumihito Arai, "On-chip gel-valve using photoprocessable thermoresponsive gel", *Robomech Journal*, 1, Article number: 5 (2014).
18. Akihiko Ichikawa, **Shinya Sakuma**, Masakuni Sugita, Tatsuro Shoda, Takahiro Tamakoshi, Satoshi Akagi, and Fumihito Arai, "On-chip enucleation of an oocyte by untethered microrobots", *Journal of Micromechanics and Microengineering*, 24, Article number: 095004 (2014).
19. Chia-Hung Dylan Tsai, Shinya Sakuma, Fumihito Arai, and Makoto Kaneko, "A new dimensionless index for evaluating cell stiffness-based deformability in microchannel", *IEEE Transactions on Biomedical Engineering*, 61(4), 1187-1195 (2014).
20. **Shinya Sakuma**, Keisuke Kuroda, Chia-Hung Dylan Tsai, Wataru Fukui, Fumihito Arai, and Makoto Kaneko, "Red blood cell fatigue evaluation based on the close-encountering point between extensibility and recoverability", *Lab on a Chip*, 14(6), 1135-1141 (2014).
21. Hiroki Kuriki, Yoko Yamanishi, **Shinya Sakuma**, Satoshi Akagi, and Fumihito Arai, "14. Local ablation of a single cell using micro/nano bubbles", *Journal of Robotics and Mechatronics*, 25(3), 476-483 (2013).

22. **Shinya Sakuma**, Masakuni Sugita, and Fumihito Arai, "Fabrication of nanopillar micropatterns by hybrid mask lithography for surface-directed liquid flow", *Micromachines*, 4, 232-242 (2013).
23. **Shinya Sakuma**, and Fumihito Arai, "Cellular force measurement using a nanometric-probe-integrated microfluidic chip with a displacement reduction mechanism", *Journal of Robotics and Mechatronics*, 25(2), 277-284 (2013).
24. Hisataka Maruyama, **Shinya Sakuma**, Yoko Yamanishi, and Fumihito Arai, "Size-dependent filtration and trapping of microparticles in a microfluidic chip using graduated gaps and centrifugal force", *Journal of Robotics and Mechatronics*, 22(3), 280-285 (2010).
25. Yoko Yamanishi, **Shinya Sakuma**, Tomohiro Iyanagi, Fumihito Arai, Tatsuo Arai, Akiyuki Hasegawa, Tamio Tanikawa, Akihiko Ichikawa, Osamu Sato, Akihiro Nakayama, Hiroshi Aso, Mitsuhiro Goto, Seiya Takahashi and Kazutsugu Matsukawa, "Design and fabrication of all-in-one unified microfluidic chip for automation of embryonic cell manipulation", *Journal of Robotics and Mechatronics*, 22(3), 371-379 (2010).
26. Yoko Yamanishi, **Shinya Sakuma**, Kazuhisa Onda, and Fumihito Arai, "Powerful actuation of magnetized microtools by focused magnetic field for particle sorting in a chip", *Biomedical Microdevices*, 12, 745-752 (2010).
27. Takehito Mizunuma, Yoko Yamanishi, Shinya Sakuma, Hisataka Maruyama, and Fumihito Arai, "Disposable inkjet mechanism for microdroplet dispensing", *Journal of Robotics and Mechatronics*, 22(3), 341-347 (2010).
28. Yoko Yamanishi, **Shinya Sakuma**, Yuki Kihara, and Fumihito Arai, "Fabrication and application of 3D magnetically driven microtools", *Journal of Microelectromechanical Systems*, 19(2), 350-357 (2010).
29. Yoko Yamanishi, Yuki Kihara, **Shinya Sakuma**, and Fumihito Arai, "On-demand production of emulsion droplets using magnetically driven microtool", *International Journal of Automation Technology*, 3(5), 502-508 (2009).
30. Yoko Yamanishi, **Shinya Sakuma**, Kazuhisa Onda, and Fumihito Arai, "Sorting of micro-particle using magnetically driven micro-tools", *Journal of the Robotics Society of Japan*, 27(4), 307-313 (2009), in Japanese.
31. Yoko Yamanishi, Yuki Kihara, **Shinya Sakuma**, and Fumihito Arai, "On-chip droplet dispensing by magnetically driven microtool", *Journal of Robotics and Mechatronics*, 21(2), 229-235 (2009).
32. **Shinya Sakuma**, Yoko Yamanishi, and Fumihito Arai, "Magnetically driven microtools actuated by a focused magnetic field for separating of microparticles", *Journal of Robotics and Mechatronics*, 21(2), 209-215 (2009).
33. Yoko Yamanishi, **Shinya Sakuma**, Kazuhisa Onda, and Fumihito Arai, "Biocompatible polymeric magnetically driven microtool for particle sorting", *Journal of Micro and Nano Mechatronics*, 4(1), 49-57 (2008)
34. Yoko Yamanishi, **Shinya Sakuma**, and Fumihito Arai, "Production and application of high-accuracy polymer-based magnetically driven microtool", *Journal of Robotics and Mechatronics*, 20(2), 273-279 (2008)

Award List (Selected Awards)

1. Young Innovator Award on Chemistry and Micro-Nano Systems (CHEMINAS Young Innovator Award)
Shinya Sakuma, from Society for Chemistry and Micro-Nano Systems, 2016
2. Best Paper Award, "On-chip cell loading using untethred nano-pipette robot"
Yusuke Kasai, **Shinya Sakuma**, Takeshi Hayakawa, and Fumihito Arai, form The 2016 International Symposium on Micro-NanoMechatronics and Human Sciences
3. Best Poster Award, "Miniaturization of Wide-range QCR Load Sensor for Biosignal Sensing"
Y. Murozaki, **S. Sakuma**, and F. Arai, from The 2015 International Symposium on Micro-NanoMechatronics and Human Sciences
4. Best Paper Award, "On-chip cell loading using untethred nano-pipette robot"
A. Ichikawa, **S. Sakuma**, and F. Arai, from The 2012 International Symposium on Micro-Nano Mechatronics and Human Science
5. Best Paper Award in Automation, "Phase decomposition of a cell passing through a micro-channel: a method for improving the evaluation of cell stiffness"
C. Tsai, M. Kaneko, **S. Sakuma**, F Arai, form 2012 IEEE International Conference on Mechatronics and Automation
6. Certificate of Merit for Journal of Robotics and Mechatronics Best Paper, "Design and fabrication of all-in-one unified microfluidicchip for automation of embryonic cell manipulation"
Yoko Yamanishi, **Shinya Sakuma**, Tomohiro Iyanagi, Fumihito Arai, Tatsuo Arai, Akiyuki Hasegawa, Tamio Tanikawa, Akihiko Ichikawa, Osamu Sato, Akihiro Nakayama, Hiroshi Aso, Mitsuhiro Goto, Seiya Takahashi and Kazutsugu Matsukawa, Journal of Robotics and Mechatronics, Vol.22, No.3, pp.371-379, form JSME Robotics and Mechatronics Division

Number of other awards: 13