



## Masayuki SOHGAWA, Ph.D.

Assistant Professor

Program: Advanced Materials Science and Technology

Area: Advanced Mechanical Science and Engineering

Undergraduate: Dept. of Engineering

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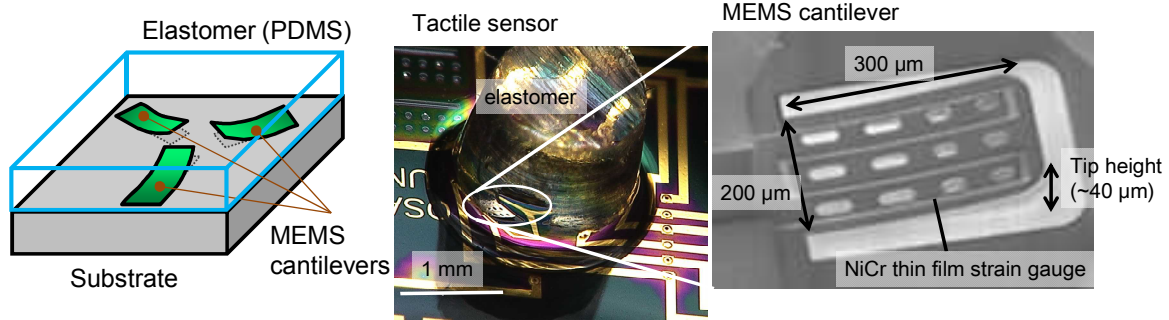
### Professional Expertise

His major research theme is development of miniature sensors using microelectromechanical systems (MEMS). MEMS devices have been utilized in pressure sensors, accelerometers, gyros, and so on. He has mainly developed tactile sensors using MEMS technologies. Tactile sensors are very important for next-generation robots such as human support robots and dexterous industrial robots. Fabricated tactile sensor embedded in the elastomer (size: 1 mm<sup>2</sup>) can detect normal and shear forces simultaneously. Tactile sensors have been applied for measurement of texture of object surface and a prevention system of pressure ulcers.

### Research Fields of Interest

MEMS Sensors

- Miniature Multi-axial Tactile Sensor (collaboration with Prof. Noma at Ritsumeikan Univ.)
  - Development of 3-axial force detection system for dexterous robots
  - Surface texture measurement using tactile sensors
  - Piezoelectric tactile sensor with BiFeO<sub>3</sub> thin film
  - Development of measurement systems for pressure ulcer prevention (collaboration with ALCARE Co., Ltd.)
  - Multimodal sensor for proximity and tactile senses
- Biological Sensor
  - Detection of biological interaction by MEMS cantilevers (collaboration with Prof. Noda at Kyoto Inst. Tech.)



### Education

2005: Ph.D. in Engineering, Graduate School of Engineering Science, Osaka University, Japan

2002: M.S. in Engineering, Graduate School of Engineering Science, Osaka University, Japan

2000: B.E. in Engineering, Faculty of Engineering Science, Osaka University, Japan

## Professional Societies and Activities

1. The Japan Society of Applied Physics
2. The Institute of Electrical Engineers of Japan
3. Material Research Society
4. The Society of Sensing Technology of Japan
5. IEEE
6. The Japan Society of Mechanical Engineers

## Awards

1. The Excellent Presentation Award in 52nd Annual Conference of The Japan Society of Mechanical Engineers, Hokuriku Shin-etsu branch
2. Outstanding Poster Award (The 31st SENSOR SYMPOSIUM on Sensors, Micromachines and Application Systems), 2014
3. The Most Outstanding Poster Award (The 29th SENSOR SYMPOSIUM on Sensors, Micromachines and Application Systems), 2012
4. The Excellent Presentation Award in the 9th Korea-Japan Conference on Ferroelectrics, 2012
5. Outstanding Paper at International Conference on Advanced Electromaterials, 2011

## Major Publications

### Papers

- [1] "Tactile Sensor Using Micro-cantilever with BiFeO<sub>3</sub> Piezoelectric Film", *IEEJ Trans. Sensors Micromachines*, vol.135, no.5, pp.158–164, 2015.
- [2] "Thermal Reactive Ion Etching Technique Involving Use of Self-heated Cathode", *Rev. Sci. Instr.*, vol.86, 045001, 2015.
- [3] "Microheater-integrated Quartz Crystal Microbalance Array for Thermal Desorption Spectroscopy", *IEEJ Trans. Sensors Micromachines*, vol.135, no.3, pp.112–113, 2015.
- [4] "Multimodal Measurement of Proximity and Touch Force by Light-and Strain-Sensitive Multifunctional MEMS Sensor", *IEEE Sensors*, pp.1749-1752, 2014.
- [5] "Bioassay of proteins in stable solution state using a novel cantilever-based liposome biosensor", *IEEE Sensors*, pp.317-320, 2014.
- [6] "Texture measurement and identification of object surface by MEMS tactile sensor", *IEEE Sensors*, pp.1706-1709, 2014.
- [7] "Miniature quartz crystal-resonator-based thermogravimetric detector", *Rev. Sci. Instr.*, vol.85, 095001, 2014.
- [8] "Proximity and Tactile Sensing Using a Single MEMS Sensor with Photo- and Strain Sensitivities", *IEEJ Trans. Sensors Micromachines*, vol.134, no.7, pp.229–234, 2014.
- [9] "Numerical Calculation and Experimental Verification of a Quartz-crystal-resonator-based Methanol Concentration Sensor", *IEEJ Trans. Sensors Micromachines*, vol.134, no.7, pp.224–228, 2014.
- [10] "Micromachining of Titanium using a Desktop DRIE", *IEEJ Trans. Sensors Micromachines*, vol.134, no.4, pp.96–99, 2014.
- [11] "Active Touch Sensing by Multi-axial Force Measurement Using High-Resolution Tactile Sensor with Microcantilevers", *IEEJ Trans. Sensors Micromachines*, vol.134, no.3, pp.58–63, 2014.
- [12] "Repetition Rate Dependence of Ferroelectric Properties of Polycrystalline BiFeO<sub>3</sub> Films Prepared by Pulsed Laser Deposition Method", *Ferroelectrics*, vol.453, pp.1-7, 2013.
- [13] "Detection of Interaction between Biological Proteins and Immobilized Liposomes by a Micro-cantilever with NiCr Thin Film Strain Gauge," *IEEE Sensors*, pp.846–849, 2013.
- [14] "Force intensity and direction measurement in real time using miniature tactile sensor with microcantilevers embedded in PDMS", *IEEE Sensors*, pp.1090-1093, 2013.
- [15] "Multi-axial Tactile Sensor with Micro-cantilever Embedded in Hemispherical Elastomer for Surface Texture Measurement", *17th Int. Conf. Solid-State Sens. Act. Microsyst.*, pp.1012-1015, 2013
- [16] "Design and Evaluation of Microheater Combined QCM Array for Thermal Desorption Spectroscopy", *17th Int. Conf. Solid-State Sens. Act. Microsyst.*, pp.234-237, 2013
- [17] "Fabrication and Noise Reduction of the Miniature Tactile Sensor Using Through-Silicon-Via Connection with Signal Amplifier", *Jpn. J. Appl. Phys.*, vol.52, pp.06GL08, 2013
- [18] "Review of Texture Measurement of Object Surface by Tactile Sensor with Inclined Micro-cantilevers", *IEEJ Trans. Sens. Micromachines*, vol.133, no.5, pp.147-154, 2013
- [19] "Preparation of epitaxial BiFeO<sub>3</sub> thin films on La-SrTiO<sub>3</sub> substrate by using magnetic-field-assisted pulsed laser deposition", *J. Korean Phys. Soc.*, vol.62, no.7, pp.1041-1045, 2013
- [20] "Miniature Ultrasonic and Tactile Sensors for Dexterous Robot", *Trans. Electr. Electro. Mater.*, vol.13, no.5, pp.215-220, 2012
- [21] "Tactile sensor array using microcantilever with nickel–chromium alloy thin film of low temperature coefficient of resistance and its application to slippage detection", *Sens. Act. A*, vol.186, pp.32-37, 2012