

2010 International Symposium on Micro-NanoMechatronics and Human Science

(MHS 2010)

**Nagoya, Japan
7 – 10 November 2010**



**IEEE Catalog Number: CFP10768-PRT
ISBN: 978-1-4244-7995-5**

TABLE OF CONTENTS

PLENARY LECTURE

Positioning Loads within the Nanometer Scale: The Mechatronic Way to Do it	1
<i>H. Wild</i>	
Interfacial Engineering in Microelectromechanical Systems: Handling and Assembly of Solids and Liquids at the Microscale	2
<i>K. Bokringer</i>	
Development of a Computer-Integrated Microsurgery System	3
<i>M. Mitsuishi</i>	

SESSION MP-1 (ORGANIZED SESSION: MICRO-NANO FLUIDICS AND BIOMEDICAL APPLICATIONS)

Refractive Index Difference Sensing Illuminated by Evanescent Wave for Noninvasive Diagnosis of Cell's Pathological State	4
<i>R. Kuiryama, Y. Tanaka, Y. Sato</i>	
An Emulsion Generating Microchannel Device Oscillated by Piezoelectric Vibrator	8
<i>T. Kanda, K. Suzumori, T. Harada, T. Ono, S. Iwabuchi, K. Ito, K. Ogawara, K. Higaki</i>	
Automatic Measurement System for Biological Applications Based on pH using ISFET Sensor Probe	14
<i>A. Yamada, S. Mohri, M. Nakamura, K. Naruse</i>	
Development of Microfluidic Cell Nucleus Separator Employing Rapid Chemical Treatment	20
<i>K. Toyama, M. Yamada, M. Seki</i>	
Application of Mechanical Stimuli using a Microfluidic Air Actuating System to Cultured Mammalian Embryos	24
<i>J. Li, K. Matsuura, Y. Kuroda, H. Funahashi, K. Naruse</i>	
Design and Fabrication of Blood Plasma Separation PMMA Chip Using Capillary Phenomenon	30
<i>H. Sakamoto, R. Hatsuda, K. Miyamura, S. Sugiyama</i>	
Sub-Micro Particle Distribution of Measurement and Simulation in Cross-section of Microchannel by Process Computed Tomography	36
<i>J. Choi, M. Takei</i>	
High Precision Magnetically Driven Microtools with Ultrasonic Vibration for Enucleation of Oocytes	42
<i>M. Hagiwara, T. Kawahara, L. Feng, Y. Yamanishi, F. Arai</i>	

SESSION MP-2 (ORGANIZED SESSION): YOUNG RESEARCHERS IN MEDICAL ROBOTICS

Integration of Diagnostics and Therapy by Ultrasound and Robot Technology	48
<i>N. Koizumi, J. Seo, D. Lee, A. Nomiya, K. Yoshinaka, N. Sugita, Y. Matsumoto, Y. Homma, M. Mitsuishi</i>	
Assemblable Tools for Laparoscopic Surgery	54
<i>T. Takayama, T. Omata, R. Oshima, M. Osaki, H. Miyamoto, K. Kojima, K. Takase, N. Tanaka</i>	
Minimal Invasive Novel Devices for Advanced Intrauterine Fetal Surgery	60
<i>H. Yamashita, G. Kitazumi, K. Kimk, K. Masamune</i>	
Visual and Haptic Augmentation Technologies for Surgical Navigation	66
<i>Y. Kuroda, O. Oshiro</i>	
MRI Compatible Manipulator with MRI-Guided Needle Insertion Support System	72
<i>I. Sato, R. Nakamura, K. Masamune</i>	
Development of Scrub Nurse Robot (SNR) Systems for Endoscopic and Laparoscopic Surgery	78
<i>K. Yoshimitsu, K. Masamune, H. Iseki, Y. Fukui, D. Hashimoto, F. Miyawaki</i>	
Inverse Problem for Stiffness Sensing of Living Soft Tissue	84
<i>N. Tanaka, M. Higashimori, M. Kaneko</i>	
Organ Biomechanical Simulators for Model based Control of Robotic RF Ablation System	90
<i>H. Watanabe, Y. Kobayashi, M. Fujie</i>	

SESSION TA-1 (ORGANIZED SESSION): BIOMANIPULATION AND INTEGRATED SYSTEMS I

Individual Single Bacterium Attachment on Microobject using Optical Tweezers for Bacteria-driven Microrobots	96
<i>K. Nogawa, M. Kojima, M. Nakajima, M. Homma, T. Fukuda</i>	
Evaluation of Bacterial Behavior in Micro-channel	100
<i>M. Kojima, M. Nakajima, T. Miyamoto, M. Homma, T. Fukuda</i>	
Magnetically Control of Nano-Structures for Intracellular Nano-Robots	104
<i>T. Matsumoto, T. Hoshino, Y. Akiyama, K. Morishima</i>	
Design and Fabrication of Temperature-Tolerant Micro Bio-Robot Driven by Insect Heart Tissue	110
<i>Y. Akiyama, T. Hoshino, K. Iwabuchi, K. Morishima</i>	
Memory on a Chip	116
<i>H. Ito, C. Hosokawa, S. Kudoh</i>	
Development of the Compact Control System Using of Neck EMG Signal for Welfare Applications	122
<i>K. Ooe, C. Villagran, T. Fukuda</i>	

SESSION TA-2 (ORGANIZED SESSION): BIO MANIPULATION FOR BIOMEDICAL INNOVATION

Gain-of-function and Loss-of-function Analyses In Vivo of Transcriptional Factor and Cytokine Genes Using Epstein-Barr Virus-based Episomal Vectors, and their Implication to Novel Strategies of Gene Therapy and Regenerative Medicine	128
<i>T. Kishida, N. Nakai, M. Matsui, K. Yoshimoto, H. Nakano, S. Masuharu, T. Shimada, S. Nakai, Y. Hisa, N. Katoh, O. Mazda</i>	
Evaluation of Promoter Activity by Using Single Cell Time Course Analysis	134
<i>K. Hakamada, J. Miyake</i>	
Alzheimer's Amyloid Beta: Lipid Membrane Interactions, Detected in Real-time	140
<i>M. Vestergaard, M. Morita, T. Hamada, M. Takagi</i>	
Reconstruction of Motile Actin Networks in Giant Liposome	145
<i>K. Takiguchi, M. Negishi, T. Yohko, M. Homma, K. Yoshikawa</i>	
Radius-Dependent Phase Behavior: Giant DNA and Alginate in a Cell Sized Sphere	151
<i>M. Negishi, M. Ichikawa, M. Nakajima, M. Kojima, T. Fukuda, K. Yoshikawa</i>	
Optical pH Regulation Using Functional Nanotool Impregnating with Photo-Responsive Chemical for Intracellular Measurement	157
<i>H. Maruyama, T. Masuda, N. Inoue, A. Honda, T. Takahata, F. Arai</i>	
Performance Evaluation of a Tiny Insect Muscle-Powered Bioactuator Using Gene Modified Drosophila Melanogaster's Dorsal Vessel Tissue	163
<i>K. Suzumura, K. Takizawa, H. Tsujimura, K. Iwabuchi, T. Hoshino, K. Morishima</i>	

PLENARY LECTURE

Multi-Scale Molecular Genetics of Prokaryotic Genome Regulation	169
<i>A. Ishihama</i>	

POSTER SESSION 2

Biomechanical Analysis and Muscle Tension Estimation of the Lower Extremities using EMG Data	170
<i>T. Iwami, K. Miyawaki, K. Hiramoto, M. Takeshima, T. Matsunaga, Y. Shimada, G. Obinata</i>	
Psychophysical Experiment on Tactile Stochastic Resonance Toward Mathematical Model	176
<i>K. Baceren, T. Jin, A. Chami, H. Yussof, T. Miyaoka, M. Ohka</i>	
Investigation on Influence of Tangential Stimulation on Velvet Hand Illusion Using Psychophysical Experiment	182
<i>N. Rajaei, Y. Kawabe, A. Chami, H. Yussof, T. Miyaoka, M. Ohka</i>	
Understanding the Reasons for Which Power-Assist-Lifted Weight is 40% of Actual Weight: The Preliminary Studies	188
<i>S. Rahman, R. Ikeura, I. Shinsuke, S. Hayakawa, H. Sawai</i>	
Adaptability Evaluation of Wheelchair Based on Physical and Mental Load	194
<i>M. Sasaki, T. Shimakura, G. Obinata, M. Yamaguchi</i>	

Robotic Wiring Harness Assembly System for Fault-tolerant Electric Connectors Mating	199
<i>B. Sun, F. Chen, H. Sasaki, T. Fukuda</i>	
Evaluation of Utility of the "Arm-Balancer" Arm Support System	203
<i>K. Miyawaki, T. Sato, T. Iwami, T. Matsunaga, S. Chida, Y. Shimada, G. Obinata</i>	
The Simulation of Semi-Autonomous Remote Power Distribution Task Robot	209
<i>S. Ito, T. Ichiyonagi, N. Maekawa, T. Murata, Y. Yamamoto, K. Tatsuno</i>	
CG Simulator for a Semi-Autonomous Remote Power Distribution Line Maintenance Robot - Installation of a Transformer	215
<i>T. Ichiyonagi, S. Ito, T. Ito, Y. Ito, T. Suzuki, M. Kazino, K. Tatsuno</i>	
Adaptive Force Control of Robot Arm with Estimation of Environmental Stiffness	221
<i>H. Wakamatsu, M. Yamanoi, K. Tatsuno</i>	
Coarse-Grained Molecular Dynamics Simulations of Adhesion on UV-Patterned Nanometer-Thick Liquid Lubricant Films	227
<i>M. Fukuda, S. Komatsu, H. Zhang, K. Fukuzawa, S. Itoh</i>	
The Effect of Ultraviolet Light Irradiation on Tribological Properties of Hydrogenated DLC	230
<i>T. Tokoroyama, T. Hatano, N. Umehara, Y. Fuwa</i>	
The Inchworm Type Self-propelled Microrobot Using a Vibration-type Friction Control Mechanism	235
<i>S. Kengaku, A. Torii, A. Ueda</i>	
Fabrication of Au Structure Using Direct Electroplating on Si Structure	241
<i>A. Tokuoka, N. Takahashi, D. Noda, T. Hattori</i>	
Lithium Niobate Optical Sensing Chip for Portable Instrument	247
<i>R. Twu, H. Hou, Y. Lee</i>	
A Retention Time Improvement Method for a MEMS Dynamic Optically Reconfigurable Gate Array	253
<i>H. Morita, M. Watanabe</i>	
Study on Fabrication of Ni Mirror Chip for Space X-ray Telescopes Utilizing LIGA Process	258
<i>M. Horade, S. Sugiyama, Y. Ezoe, I. Mitsuishi, K. Ishizu, T. Moriyama, Z. Mitsuda, S. Kinuta, T. Yamanashi, Y. Ichinosawa</i>	
Configuration Design of Piezo Actuator for Hollow Tube Type Micropump	264
<i>K. Ohuchi, K. Tsuchiya, Y. Uetsuji</i>	
Combination Compress Sensing and Digital Wireless Transmission for the MRI Signal	270
<i>T. Tran, T. Duc, T. Bui</i>	
The Wound Repair is Control by Monocyte Linage Cells	274
<i>N. Nishio, S. Ito, Y. Okawa, K. Isobe</i>	
Fabrication and Evaluation of Nano Probe pH Sensor based on Nanorobotic Manipulation	279
<i>Z. Yang, M. Nakajima, Y. Ode, Z. Zhang, T. Fukuda</i>	
Bio-manipulation with a Robotic Straw	285
<i>H. Mochiyama, Y. Shirato, H. Kobayashi, J. Tatsuno, H. Kawai</i>	
Fluorescence Observation and Manipulation of Individual DNA Molecules in a Microfluidic Channel	291
<i>H. Kurita, H. Aoki, T. Takata, A. Asada, H. Yasuda, K. Takashima, A. Mizuno</i>	
Novel Integration Method for Chemical and Enzyme Sensor Array by Using Microcontact Printing	296
<i>M. Suzuki, A. Nomura, M. Yamamoto, K. Minakuchi, Y. Iribe</i>	
Conformational Change of Giant DNA Induced by Ascorbic Acid 2-Glucoside in Relation to Radiosensitivity	302
<i>M. Suzuki, Y. Yoshikawa, N. Chen, A. Zinchenko, T. Mori, T. Kanbe, S. Murata, T. Imanaka, K. Yoshikawa</i>	

SESSION TP1-1 (ORGANIZED SESSION): BIOMANIPULATION AND INTEGRATED SYSTEMS II

Soft Handling Probe Using Thermal Gel for Single Cells	306
<i>M. Takeuchi, M. Nakajima, M. Kojima, T. Fukuda</i>	
Nano Knife Fabrication and Calibration for Single Cell Cutting Inside Environmental SEM	312
<i>Y. Shen, M. Nakajima, S. Kojima, M. Homma, T. Fukuda</i>	
Control and Sensing Platform of Magnetically driven Microtool for On-Chip Single Cell Evaluation	317
<i>T. Kawahara, M. Hagiwara, Y. Yamanishi, F. Arai</i>	
Workspace Optimization for Multi-Scale Micromanipulation System	323
<i>E. Avci, K. Ohara, T. Takubo, Y. Mae, T. Arai</i>	
Microassembly Combining Pick-and-place and Water Mist	329
<i>B. Chang, M. Jaaskelainen, Q. Zhou</i>	

SESSION TP1-2: ROBOT AND CONTROL SYSTEM

On Comparing Two Methods for Low Degree-of-Freedom Mechanisms	334
<i>S. Kamada, Y. Kim, G. Obinata</i>	
Three-Dimensional Bipedal Walking Control based on Adaptation of PDAC Constants	340
<i>T. Aoyama, K. Sekiyama, Y. Hasegawa, T. Fukuda</i>	
Dynamic Transition Motion from Ladder Climbing to Brachiation for a Multi-Locomotion Robot	346
<i>Z. Lu, T. Aoyama, K. Sekiyama, Y. Hasegawa, T. Fukuda</i>	
Control of A Rehabilitation Robotic Exoskeleton Based on Intentional Reaching Direction	351
<i>W. Huo, J. Huang, Y. Wang, J. Wu</i>	

SESSION TP2-1 (ORGANIZED SESSION): BIOMANIPULATION FOR BIOMEDICAL ENGINEERING

Microfluidic Experimental Array Using Micro-rotation Flow for Producing Size-controlled Three-dimensional Spheroids	357
<i>H. Ota, T. Kodama, N. Miki</i>	
The Development of a 3-D Scaffold Formed of Electrospayed Nano-Fibrous Microcapsules	362
<i>R. Tane, M. Ikeuchi, M. Fukuoka, K. Ikuta</i>	
One-Step Stem Cell Cluster Culture Process Using Hydrophilic Tapered Stencil Mask	368
<i>M. Ikeuchi, K. Oishi, H. Noguchi, S. Hayashi, K. Ikuta</i>	
Numerical Comparison of Catheter Insertion Trajectory within Blood Vessel Model using Image Processing	372
<i>C. Tercero, S. Ikeda, T. Fukuda, F. Arai, M. Negoro, I. Takahashi</i>	
Numerical Simulation for Blood Flow in Internal Carotid Artery for Integration with Photoelastic Stress Analysis	378
<i>M. Kojima, C. Tercero, S. Ikeda, Y. Sakai, T. Fukuda, F. Arai, M. Negoro</i>	

SESSION TP2-2: ROBOT AND HUMAN SYSTEMS

Autonomous Cooperation Formation for Multi-Robot	384
<i>D. Kato, K. Sekiyama, T. Fukuda</i>	
Active Sensing and Information Structuring for Intelligent Robot Vision with Range Imaging Sensor	390
<i>H. Sasaki, T. Fukukawa, C. Fei, S. Baiqing, T. Fukuda</i>	
Investigation of Human Mirror-image for Bilateral Movement Training of Upper Limb Rehabilitation	396
<i>K. Park, Y. Kim, C. Nagai, G. Obinata</i>	
Toward Developing a Power Assist Robot for Lowering Heavy Objects: Analysis of Human Characteristics and Object Motions	402
<i>S. Rahman, R. Ikeura, I. Shinsuke, S. Hayakawa, H. Sawai</i>	
Investigation on Mechanism of Velvet Hand Illusion Using FEM Analysis	408
<i>A. Chami, N. Rajaei, H. Yussof, M. Ohka</i>	

SESSION WA-1: MICRO-NANO DEVICES AND ANALYSIS

Microfabricated 3D Flexible Tactile Sensor with Table-shaped Structure for Intelligent Robot Fingers	414
<i>J. Lee, H. Hida, M. Shikida, K. Sato</i>	
Design and Characterization of High-Performance Contactless Gripper Using Spiral Air Flows	417
<i>K. Morimoto, Y. Tada, H. Takashima, K. Minamino, R. Tahara, S. Konishi</i>	
Controlled Thermal Emission of Narrow-band IR Waves for Patient Monitoring Outside the Hospital	423
<i>K. Masuno, S. Kumagai, M. Sasaki</i>	
Proton Beam Writing Micro Fabrication System for Micro Chemical Devices	429
<i>P. Truong, R. Teshima, T. Hasegawa, H. Nishikawa</i>	
Finite Element Analysis on Crosstalk Effect of Dual-Axis Micro-Mechanical Probe for Friction Force Microscope	435
<i>H. Amakawa, K. Fukuzawa, M. Shikida, H. Zhang, S. Itoh</i>	
Theoretical Investigation of Piezo-Optic Effect in Photonic Crystal Nanocavity for Nanostrain Detection	439
<i>D. Dao, T. Bui, S. Sugiyama</i>	

In-situ Transmission Electron Microscopy of Structural Change of the Contact between a Carbon Nanotube and Gold by Local Joule Heating	443
<i>M. Karita, K. Asaka, H. Nakahara, Y. Saito</i>	

SESSION WA-2: (ORGANIZED SESSION): HUMAN ROBOT INTERACTION FOR AMBIENT INTELLIGENCE

Structured Intelligence for Cyclic Learning based on Spiking-Neural Network for Human Friendly Robots	447
<i>H. Masuta, N. Kubota</i>	
Home Appliance Service System by using an object Position and Multimodal Interaction with Communication Robot	453
<i>M. Iwasawa, T. Yamaguchi, Y. Fujimoto</i>	
Interaction between a User and a Smart Electric Wheelchair in Intelligent Space	459
<i>M. Niitsuma, T. Ochi, M. Yamaguchi, H. Hashimoto</i>	
Approaching Vehicle Alert System for Pedestrians using UWB Impulse Radio	465
<i>K. Nakamura, H. Matsumoto, S. Kobayashi, N. Koshizuka, K. Sakamura</i>	
Event Recognition using Object-Motion Context	471
<i>K. Sekiyama, K. Watanabe, M. Rizki, T. Fukuda</i>	
Human Intention Estimation Algorithm Design for Robot in Human and Robot Cooperated Cell Assembly	477
<i>F. Chen, B. Sun, J. Huang, H. Sasaki, T. Fukuda</i>	
Mechanical Fatigue Fracture of Silicon - Potential Danger to the Reliability of Silicon MEMS Structures	483
<i>S. Kamiya</i>	
Design Analysis of Self-organized and Frameless Swimming Bio-Robots with Cardiomyocyte Gel	484
<i>R. Takemura, T. Hoshino, Y. Akiyama, K. Morishima</i>	
Nanoprobe Insertion for Nanoinjection based on E-SEM Nanorobotic Manipulation	490
<i>M. Nakajima, T. Hirano, M. Kojima, N. Hisamoto, M. Homma, B. Lee, T. Fukuda</i>	
Author Index	