

Technical Program: 1. Day – July 2

1. Day – July 2: Plenary sessions		Room AS2
08:30 – 09:00 Opening ceremony		
09:00 – 10:40 Keynote talks Chair: Metin Sitti / MPI for Intelligent Systems, DE		
09:00	Human gas sensing capsule: The future of diagnostics Kourosh Kalantar-zadeh / Univ of New South Wales, Sydney, AU	
09:50	High frequency metrology at small scales Pavel Kabos / National Inst of Standards (NIST), Boulder, US	
16:20 – 18:20 Plenary talks Chair: Samara Firebaugh U.S. Naval Academy, Annapolis, MD, US		
16:20	The combination of soft microfingers and wearable interface device for haptic teleoperation robot system Satoshi Konishi , S. Otake, H. Kosawa, A. Hirata, F. Mori Ritsumeikan Univ, Shiga, JP	
16:50	Manipulating individual atoms within materials using a focused electron beam Toma Susi , M. Tripathi, K. Mustonen, A. Markevich, C. Mangler, J. Kotakoski / Univ of Vienna, AT	
17:20	Microfluidic manipulation toward automated and integrated isolation of aptamers targeting live cells Qiao Lin , J. Zhu, T. Olsen / Columbia Univ, US	
17:50	Microdevices with ultrafast actuation based on magnetic-field-induced strains of Ni-Mn-Ga Kari Ullakko / Lappeenranta Univ of Technology, FI	

1. Day – July 02: Parallel technical sessions		11:00 – 13:00
Special session Magnetic-based manipulation at small scales (I) Room AS2 Organized & chaired by Zoran Cenev / Aalto Univ, FI Jaakko Timonen / Aalto Univ, FI		
11:00	Manipulation by single and collectives of mobile magnetic microrobots Metin Sitti / Max Planck Inst for Intelligent Systems, DE	
11:20	Acousto-magnetic micro/nanorobotic systems Daniel Ahmed / ETH Zurich, CH	
11:40	Magnetolectric nanocleaners Salvador Pané i Vidal / ETH Zurich, CH	
12:00	Particle displacement at air-ferrofluid interface Zoran Cenev / Aalto Univ, FI	
12:20	Magnetic manipulation of non-magnetic objects at microscale Jaakko Timonen / Aalto Univ, FI	
Special session Molecular robotics / Bottom-up artificial cell Room AS1 Organized & chaired by Shin-ichiro Nomura / Tohoku Univ, JP Masahiro Takinoue / Tokyo Inst of Tech, JP		
11:00	Amoeba-type molecular robot Shin-ichiro Nomura / Tohoku Univ, JP	
11:20	Molecular swarm robot driven by chemical energy Akira Kakugo / Hokkaido Univ, JP	
11:40	Dynamic DNA-based machines powered by artificial metabolism Shogo Hamada / Cornell Univ, US	
12:00	Asymmetric lipid vesicle generation for creating complex artificial cells Koki Kamiya / Gunma Univ, JP	
12:20	Pico-liter order volume handling and substance transport between a single cell and a giant liposome Keisuke Morishima / Osaka Univ, JP	

1. Day – July 02: Parallel technical sessions		11:00 – 13:00
Special session		Biomedical robots at meso-micro-nanoscales (I)
Room TU1		Organized & chaired by Pierre Lambert / Ecole Polytechnique de Bruxelles, BE Kanty Rabenorosoa, Brahim Tamadazte and Aude Bolopion / FEMTO-ST, FR
11:00	Tunable stiffness mechanisms in soft microrobotics Pierre Lambert / Ecole Polytechnique de Bruxelles, BE	
11:20	Soft continuum robots for medical applications Kanty Rabenorosoa / FEMTO-ST, FR	
11:40	Toward multiaxial force sensing at a fibre tip Antoine Barbot / Imperial College of London, UK	
12:00	Magnetic continuum robots in medicine: Technologies and future challenges Quentin Boehler / ETH Zurich, CH	
12:20	Laser surgery devices and control schemes Brahim Tamadazte / FEMTO-ST, FR	
Special session		Similarities and differences between artificial and biological microrobots
Room TU3		Organized & chaired by Juliane Simmchen and Veronika Magdanz / TU Dresden, DE
11:00	Sperm-driven and sperm-templated magnetic microrobots Veronika Magdanz ^a , J. Gebauer ^a , D. Mahdy ^b , J. Simmchen ^a , I.S.M. Khalil ^c ^a TU Dresden, DE; ^b German Univ in Cairo, EG; ^c Univ of Twente, NL	
11:20	Interactions with surroundings and tracer particles Juliane Simmchen / TU Dresden, DE	
11:40	Deep learning for measurement and manipulation on the microscale Giovanni Volpe / Univ Gothenburg, SE	
12:00	Integrative design of synthetic and biological microrobotics: Efficiency control and automation Maria Guix Noguera / IBEC Barcelona, ES	
12:20	Magnetic active matter based on helical propulsion Ambarish Ghosh / Indian Inst of Sci, Bangalore, IN	
12:40	Optimal searches for active particles: A lesson from animal foraging Giorgio Volpe / Univ College London, UK	

1. Day – July 02:		Parallel technical sessions	11:00 – 13:00
Special session		Mechanical testing of materials at micro/nano scales	
Room AS3		Organized & chaired by Gaurav Mohanty / Tampere Univ, FI	
11:00	Development of high throughput micro-mechanical testing device Markus Kakkonen / Tampere Univ, FI		
11:20	Micromechanical characterization of plants: From single cells to plant tissues Nino F. Läubli / ETH Zurich, CH		
11:40	Characterization of fibers based on micro-robotics approach and cross-section full field measurement Cédric Clévy / FEMTO-ST, FR		
12:00	Recent innovation in the field of in-situ micro and nanoscale mechanical testing Nicholas Randall / Alemnis AG		
12:20	Mechanics meets electronics at nano scale: From curious plasticity of GaAs to Si nanoparticles Roman Novak / Aalto Univ, FI		
12:40	Microcompression high cycle fatigue tests up to 10 million cycles Aloshious Lambai / Tampere Univ, FI		
Regular session		Positioning and control	
Room AS4		Chair: Benliang Zhu / South China Univ of Tech, CN	
11:00	Development and analysis of a novel large range voice coil motor-driven 3-DOF XY θ micro-positioning mechanism Ammar Al-Jodah , B. Shirinzadeh, M. Ghafarian, T.K. Das, W. Wei Monash Univ, AU		
11:20	A Lagrangian model to predict microscallop motion in non-Newtonian fluids Yashaswini Murthy , R. Banavar / Indian Inst of Tech Bombay, IN		
11:40	A 2-DOF positioning stage for high speed AFM scanning Benliang Zhu , S. Lin, H. Zhang, H. Li, X. Zhang / South China Univ of Tech, CN		
12:00	You spin my robot round and round: Magnetic control of microrobot alignment Daniel F. Vilhena ^a , M. Neto ^b , S. Cardoso ^b , H.A. Ferreira ^a ^a Univ de Lisboa, PT; ^b INESC, PT		
12:20	Attachment, detachment, and navigation of small robots using local magnetic fields Praneet N. Chakravarthula , S. Shekhar, G. K. Ananthasuresh Indian Inst of Sci, Bangalore, IN		
12:40	Towards microrobot out-of-plane control via planar multi-spot Dandan Zhang , A. Barbot, M. Grammatikopoulou, G.-Z. Yang Imperial College London, UK		

1. Day – July 02: Parallel technical sessions		14:00 – 16:00
Special session		Magnetic-based manipulation at small scales (II)
Room AS2		Organized & chaired by Zoran Cenev and Jaakko Timonen / Aalto Univ, FI
14:00	Magnetic micropillars for micro-bead and droplet manipulation Zoran Cenev / Aalto Univ, FI	
14:20	Methods and results for rotation of diamagnetic robots using translational designs Ronald Pelrine , A. Hsu, A. Wong-Foy / SRI International, US	
14:40	MicroFactory: Low cost multi-robot micro-manipulation platform Allen Hsu / SRI International, US	
15:00	Independent position control of two magnetic microrobots via rotating magnetic field in two dimensions M. Salehizadeh, Z. Li, Eric Diller / Univ of Toronto, CA	
15:20	Automatic control of magnetic particles by electromagnetic needle Jean-Antoine Seon / Aalto Univ, FI	
Special session		Design and control of micro and nano precision mechatronic systems (I)
Room AS1		Organized & chaired by Michael G. Ruppert, Yuen K. Yong / Univ of Newcastle, AU and Hamed Sadeghian / Eindhoven Univ of Tech, NL
14:00	Design and characterization of a MEMS probe scanner for on-chip AFM Mohammad Maroufi , A. Alipour, H. Alemansour, S.O.R. Moheimani Univ of Texas at Dallas, US	
14:20	A five-axis monolithic nanopositioning stage constructed from a bimorph piezoelectric sheet Meysam Omidbeike , Y.K. Yong, S.I. Moore, A.J. Fleming Univ of Newcastle, AU	
14:40	Multivariable model-less feedforward control of a monolithic nanopositioning stage with FIR filter inversion Meysam Omidbeike ^a , A.A. Eielens ^b , Y.K. Yong ^a , A.J. Fleming ^a ^a Univ of Newcastle, AU; ^b Univ of Stavanger, NO	
15:00	Sinusoidal scanning with Gaussian-process-based hysteresis compensation for fast imaging of AFM Yi-Dan Tao , L.-M. Zhu / Shanghai Jiao Tong Univ, CN	
15:20	Improving closed-loop motion control properties using a dithered DAC Arnfinn Eielens / Univ of Stavanger, NO	

1. Day – July 02: Parallel technical sessions		14:00 – 16:00
Special session Biomedical robots at meso-micro-nanoscales (II) Room TU1 Organized & chaired by Pierre Lambert / Ecole Polytechnique de Bruxelles, BE Kanty Rabenorosoa, Brahim Tamadazte and Aude Bolopion / FEMTO-ST, FR		
14:00	Synthetic and bio-hybrid microswimmers for medical applications Metin Sitti / Max Planck Inst for Intelligent Systems, DE	
14:20	Non contact microrobotics for highly selective cell sorting: Towards the development of innovative medicines Aude Bolopion / FEMTO-ST, FR	
14:40	Feedback controlled dielectrophoresis - high-accuracy translation and rotation at micro and meso scales Tomás Michálek / Czech Technical Univ, Prague, CZ	
15:00	4D microprinted magnetic microactuators for dexterous and untethered manipulation of micrometric objects Viktor Vieille / Univ Grenoble Alpes, FR	
15:20	Soft-bodied miniature robotic swarm for biomedical applications František Mach / Univ of West Bohemia, CZ	
Special session Capillary interactions on soft materials Room TU3 Organized & chaired by Bo Chang / Shaanxi Univ of Sci & Tech, CN		
14:00	Pick and release of micro-objects: An actuation-free method to change the conformity of a capillary contact Antonio Iazzolino ^a , Youness Tourtit ^{a,b} , Adam Chafaï ^b , Tristan Gilet ^a , Pierre Lambert^b , Loïc Tadrist ^a ^a Univ of Liege, BE; ^b Univ Libre de Bruxelles, BE	
14:20	Capillary adhesion of thin sheets on curved surfaces Etienne Reyssat / Sorbonne Univ, FR	
14:40	Effect of wettability on the performance of hierarchical structure-based devices Weixuan Jing / Xi'an Jiaotong Univ, CN	
15:00	Magnetocapillary dynamics of magnetic droplets Matilda Backholm / Aalto Univ, FI	
15:20	Capillary based micromanipulation of soft ribbons Bo Chang / Aalto Univ, FI; Shaanxi Univ of Sci and Techn, CN	

1. Day – July 02:		Parallel technical sessions	14:00 – 16:00
Special session		Biomaterial Based Functional Devices (BBFD)	
Room AS3		Organized & chaired by Sampo Tuukkanen, Veikko Sariola and Antti Vehkaoja / Tampere Univ, FI	
14:00	Introduction to use of bio-based materials for functional devices Orlando Rojas / Aalto Univ, FI		
14:20	Fabrication of stable nanofibrillated cellulose 3D structure: Combination of bioprinting and freeze-drying Anum Rasheed, S. Tuukkanen / Tampere Univ, FI		
14:40	Heating element Salmiakki – Manufactured using cellulose pulp, nanocellulose and carbon nanotubes / Sanna Siljander ^a , P. Keinänen ^a , A. Ivanova ^b , J. Lehmonen ^c , S. Tuukkanen ^a , M. Kanerva ^a , T. Björkqvist ^a ^a Tampere Univ, FI; ^b Aalto Univ, FI; ^c VTT Technical Research Centre of Finland Ltd		
15:00	Nanocellulose films as substrates for printed electronics Arno Pammo, H. Christophliemk, J. Keskinen, T. Björkqvist, S. Siljander, M. Mäntysalo, S. Tuukkanen / Tampere Univ, FI		
15:20	Pulling water from air – Design and fabrication of bioinspired surfaces for large scale water harvesting Vipul Sharma, V. Sariola / Tampere Univ, FI		
Regular session		Automation (I)	
Room AS4		Chair: Pasi Kallio / Tampere Univ, FI	
14:00	Machine vision for on-line monitoring of near-field electrospinning Nicolas Martinez-Prieto, J. Cao, K. Ehmann / Northwestern Univ, US		
14:20	Trade-off between resolution and frame rate for visual tracking of mini-robots on planar surfaces Martin Juřík, V. Šmídl, J. Kuthan, F. Mach / Univ of West Bohemia, CZ		
14:40	A magnetic actuation system for the active microrheology in soft biomaterials Moonkwang Jeong ^a , E. Choi ^a , D. Li ^a , S. Palagi ^{a,b} , P. Fischer ^{a,c} , T. Qiu ^a ^a Max Planck Inst for Intelligent Systems, DE; ^b Inst Italiano di Tec, Penedera, IT; ^c Univ of Stuttgart, DE		
15:00	Tracking experiments with ChevBot: A laser-actuated Stick-Slip microrobot Ruoshi Zhang, A. Sherehiy, D. Wei, Z. Yang, M.N. Saadatzi, D.O. Popa Univ of Louisville, US		
15:20	Force feedback control scheme for microrobotic 3-point bending test of fibres T. Eslami, Pasi Kallio / Tampere Univ, FI		

Technical Program: 2. Day – July 3

2. Day – July 3: Plenary sessions		Room AS2
08:50 – 09:40		Keynote talk
09:40 – 10:40		Plenary talks Chair: Bahareh Behkam / Virginia Tech, US
08:50	Directed parallel assembly across length scales exploiting surface tension and Coulomb forces Heiko O. Jacobs / Ilmenau Univ of Technology, DE	
09:40	Actuation and propulsion methods for micro-nano robotic systems Fumihito Arai / Nagoya Univ, JP	
10:10	Laser-heated autonomous microswimmers Alois Würger / Université de Bordeaux, FR	
16:20 – 18:20		Plenary talks Chair: Hongsoo Choi / DGIST, KR
16:20	MEMS advances for measurements at small scales: The vertical silicon probes technology extended to nearfield optics B. Walter ^b , E. Mairiaux ^b , S. Eliet ^a , J.-F. Lampin ^a , Marc Faucher^a ^a CNRS-IEMN, FR; ^b Vmicro SAS, FR	
16:50	A discretely assembled walking motor Will Langford , N. Gershenfeld / Massachusetts Inst of Tech, US	
17:20	Robotic navigation with audio cues inspired by sound localization techniques of crickets S. Khandare, R. Balakrishnan, Rudra Pratap / IIS, Bangalore, IN	
17:50	Robotic intracellular manipulation and measurement Yu Sun / Univ of Toronto, CA	

2. Day – July 03: Parallel technical sessions		11:00 – 13:00
Special session		Magnetic-based manipulation at small scales (III)
Room AS2		Organized & chaired by Zoran Cenev and Jaakko Timonen / Aalto Univ, FI
11:00	On-chip manipulation of magnetic microbeads by combination of polarization and gradient fields Ulrich Herr / Univ of Ulm, DE	
11:20	Geometry optimization of helical swimming at low Reynolds number Johan E. Quispe Navarrete , A. Oulmas, S. Régnier Sorbonne Univ, FR	
11:40	High resolution clinical imaging of soft magnetic microrobots Veronica Iacovacci Scuola Superiore Sant'Anna, Pisa, IT	
12:00	Transport and delivery of biological agents at microscale Mahmut Selman Sakar / EPFL Lausanne, CH	
12:20	Microrobot design for micromanipulation with orientation control using local magnetic fields Benjamin V. Johnson , D.J. Cappelleri / Purdue Univ, US	
Special session		Control of bio-hybrid & bio-inspired microrobotic systems
Room AS1		Organized & chaired by Bahareh Behkam / Virginia Tech, US
11:00	Neuromuscular tissue circuits from <i>Aplysia californica</i> for control and actuation of biohybrid robots Victoria A. Webster-Wood / Carnegie Mellon Univ, US	
11:20	Augmented reality for the engineering of collective behaviours in microsystems Ana Maria Rubio Denniss , T.E. Gorochowski, S. Hauert / Univ of Bristol, UK	
11:40	Statistical modeling of a distributed network of bacteria-propelled microrobots (BacteriaBots) E.J. Leaman, B.Q. Geuther, A. Sahari, Bahareh Behkam / Virginia Tech, US	
12:00	Control of bioactuated MicroNano system and living machined wet robotics Keisuke Morishima / Osaka Univ, JP	
12:20	Dynamic modeling of self-phoretic magnetic Janus microrobot David Folio Inst National des Sciences, Appliquées Centre Val de Loire, FR	

2. Day – July 03: Parallel technical sessions 11:00 – 13:00	
Special session Manipulation and characterization of cells and organisms Room TU1 Organized & chaired by Yu Sun / Univ of Toronto, CA Pasi Kallio / Tampere Univ, FI	
11:00	Automation in Organ-on-Chip systems Pasi Kallio / Tampere Univ, FI
11:20	Microfluidic manipulation of <i>C. elegans</i> Xinyu Liu / Univ of Toronto, CA
11:40	Fabrication and flow resistance test of microrobot with fixation function Seungmin Lee^a , J.-Y. Kim ^a , B.J. Nelson ^b , H. Choi ^a ^a Daegu-Gyeongbuk Inst of Sci & Tech (DGIST), KR; ^b ETH Zurich, CH
12:00	Cell manipulation for personalized medicine Yu Sun / Univ of Toronto, CA
12:20	Manipulation of <i>E. Coli</i> in microfluidic systems Jan Busche / Tech Univ Braunschweig, DE
12:40	Quantification of cell-cell and cell-ECM forces in shape-restricted pairs of epithelial cells Jens Möller / ETH Zurich, CH
Special session Smart sensors for micro-nano robotics (I) Room TU3 Organized & chaired by Tie Li Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN	
11:00	Electric property detection for single cell based on microfluidics platform Junbo Wang / Inst of Electronics, CAS, CN
11:20	Multi-analysis: From sensing to perception Fengyu Li / Jinan Univ, CN
11:40	A single microcantilever-based metal oxide semiconductor gas sensor Lei Xu / Univ of Sci and Tech of China, CN
12:00	Fabrication and characterization of Si ₃ N ₄ nanopore using FIB and SEM Zhishan Yuan / Guangdong Univ of Tech, CN
12:20	Design and experiments of a resonant pressure sensor based upon electrostatically driven and piezoresistively sensed lateral resonators X. Shi ^{a,b} , S. Zhang ^{a,b} , Deyong Chen^a , J. Wang ^a , J. Chen ^a , B. Xie ^a , Y. Lu ^{a,b} ^a Inst of Electronics, CAS, CN; ^b Univ of CAS, Beijing, CN

2. Day – July 03: Parallel technical sessions		11:00 – 13:00
Regular session		Design and fabrication (I)
Room AS3		Chair: Donglei (Emma) Fan / Univ of Texas at Austin, US
11:00	Design of a novel parallel monolithic 3-DOF compliant micromanipulator M. Ghafarian ^a , B. Shirinzadeh ^a , Ammar Al-Jodah ^a , T.K. Das ^a , W. Wei ^a , Y. Tian ^b , D. Zhang ^c ^a Monash Univ, AU; ^b Univ of Warwick, UK; ^c Tianjin Univ, CN	
11:20	Fabrication of soft-microrobot having soft-rigid hybrid structure T. Watanabe ^a , Y. Yokoyama ^b , Takeshi Hayakawa ^a ^a Chuo Univ, JP; ^b Toyama Industrial Technology R&D Center, JP	
11:40	Resonant properties of a T-shape AlN piezoelectric structure for MEMS device J. Yang ^{a,b} , C. Si ^a , G. Han ^a , M. Zhang ^a , J. Ning ^a , F. Yang ^a , Xiaodong Wang ^{a,b} ^a Inst of Semiconductors, CAS, CN; ^b Univ of CAS, Beijing, CN	
12:00	On the realization of self-sensing piezoelectric MEMS actuators Sudhanshu Tiwari ^a , R. Kumar ^a , P.K. Menon ^b , A. Jeyaseelan A ^c , S. Dutta ^d , R. Pratap ^a ^a IIS, Bangalore, IN; ^b Research Centre Imarat, Hyderabad, IN; ^c IIT, Madras, IN; ^d National Aerospace Labs, Bangalore, IN	
12:20	Efficiently light-controlled reconfigurable semiconductor micromotors in electric fields Z. Liang, Donglei (Emma) Fan / Univ of Texas at Austin, US	
Regular session		Micro/Nano robots (I)
Room AS4		Chair: Wenzeng Zhang / Tsinghua Univ, CN
11:00	A novel universal gripper with multi-layer circular sliding bars B. Liang, Wenzeng Zhang / Tsinghua Univ, CN	
11:20	Milli-scale biped vibratory water strider Ki Yun Lee , L. Wang, J. Qu, K. Oldham / Univ of Michigan, US	
11:40	A capsule-type device for soft tissue cutting using a threadless ballscrew actuator Oksana Tovmachenko , L. Feng, A.M. Mousa, Z. Ullah, M.A. Masoud Beihang Univ, CN	
12:00	Fiber-crawling microrobots S. Challa, M. S. Islam, Cindy K. Harnett / Univ of Louisville, US	
12:20	Hydrogel microrobot capable of retrieving magnetic nanoparticles Dong-in Kim , H. Lee, S.-H Kwon, H. Choi, S. Park / DGIST, KR	
12:40	Disturbance rejection for a microrobot application M. Feemster, J. Thompson, J. Piepmeier, Samara Firebaugh / U.S. Naval Acad, US	

2. Day – July 03: Parallel technical sessions		14:00 – 16:00
Special session		Micro/nano robotics and its biomedical application
Room AS2		Organized & chaired by Lianqing Liu / Shenyang Inst of Automation, CAS, CN Yajing Shen / City Univ of Hongkong, SAR, CN
14:00	Assembly and movement control of micro-objects with bubble microrobot Niandong Jiao / Shenyang Inst of Automation, CAS, CN	
14:20	Living cell based sensing and actuation for biosyncretic robot Lianqing Liu / Shenyang Inst of Automation, CAS, CN	
14:40	Light-driven bio-inspired soft robots based on graphene materials Yuanyuan Yang / City Univ of Hongkong, SAR, CN	
15:00	Robotic micromanipulation of small model organisms Xinyu Liu / Univ of Toronto, CA	
15:20	Long time field emission of Pt/MWCNT hybrid nanowire for electron gun W. Zhang ^a , L. Dong ^b , Y. Shen ^b , Zhan Yang^a ^a Soochow Univ, CN; ^b City Univ of Hongkong, SAR, CN	
Special session		Design and control of micro and nano precision mechatronic systems (II)
Room AS1		Organized & chaired by Michael G. Ruppert, Yuen K. Yong / Univ of Newcastle, AU and Hamed Sadeghian / Eindhoven Univ of Tech, NL
14:00	Model-based identification of nanomechanical properties in Atomic Force Microscopy Michael R.P. Ragazzon , J.T. Gravdahl, K.Y. Pettersen Norwegian Univ of Sci and Tech, NO	
14:20	Subsurface Scanning Probe Microscopy for non-destructive imaging of nano-scale buried structures Hamed Sadeghian / Eindhoven Univ of Tech, NL	
14:40	Multifrequency measurement for characterizing nonlinear response at the nanometer scale Daniel Forchheimer / KTH Royal Inst of Tech; Intermodulation Products AB, SE	
15:00	Modeling and noise analysis of a microcantilever-based mass sensor David M. Harcombe , M.G. Ruppert, A.J. Fleming / Univ of Newcastle, AU	
15:20	Model-based Q Factor control for photothermally excited microcantilevers Michael G. Ruppert^a , B.S. Routley ^a , A.J. Fleming ^a , Y.K. Yong ^a , G.E. Fantner ^b ^a Univ of Newcastle, AU; ^b École Polytechnique fédérale de Lausanne (EPFL), CH	
15:40	Nanometer precise grayscale patterning using heatable scanning probes Armin W. Knoll / IBM Research, Zurich, CH	

2. Day – July 03: Parallel technical sessions		14:00 – 16:00
Special session		Micromotors on the way to in-vivo applications
Room TU1		Organized & chaired by Mariana Medina-Sánchez Leibniz Inst for Solid State and Materials Research (IFW), DE
14:00	Sperm-carrying magnetic micromotors towards assisted fertilization Mariana Medina-Sánchez Leibniz Inst for Solid State and Materials Research (IFW), DE	
14:20	Magnetolectric swimmers for applications in the central nervous system Salvador Pané i Vidal / Swiss Federal Inst of Tech (ETH) Zurich, CH	
14:40	Micromotors for biosensing on-the-fly Carmen C. Mayorga-Martínez / Center for Advanced Functional Nanorobots, CZ	
15:00	Magnetic micromotors for resilient and reversible cargo transport in and between microfluidic environments Lukas Schwarz^a , M. Medina-Sánchez ^a , O.G. Schmidt ^{a,b} ^a Leibniz Inst for Solid State and Mater Res (IFW), DE; ^b Chemnitz Univ of Tech, DE	
15:20	Optoacoustic detection of 3D microstructures in deep tissue-mimicking phantoms/ Azaam Aziz^a , M. Medina-Sánchez ^a , J. Claussen ^b , O.G. Schmidt ^{a,c} ^a Leibniz Inst for Solid State and Mater Res (IFW), DE; ^b iThera Medical GmbH; ^c Chemnitz Univ of Tech, DE	
15:40	Retrieval of magnetic microrobots from the bloodstream Veronica Iacovacci / Scuola Superiore Sant'Anna, Pisa, IT	
Special session		Ultrasonic micromanipulation
Room TU3		Organized & chaired by Heikki J. Nieminen / Aalto Univ, FI
14:00	Ultrasonic microrobotics in liquids Jürg Dual / Swiss Federal Inst of Tech (ETH) Zurich, CH	
14:20	Pulsed ultrasound for delivering plasmids and drugs: Application to in vitro transfection and blood brain barrier opening in vivo Jean-Louis Mestas / INSERM, FR	
14:40	Motion of heavy particles on a submerged Chladni plate Kourosh Latifi / Aalto Univ, FI	
15:00	Ultrasonic activation of a packed bed for nanoparticle capture Adrian Neild / Monash Univ, AU	
15:20	Ultrasonically actuated medical needle Emanuele Perra / Aalto Univ, FI	
15:40	Ultrasonic object manipulation using phased arrays and field multiplexing Luke Cox / Univ of Bristol, UK	

2. Day – July 03: Parallel technical sessions		14:00 – 16:00
Special session		Research on space applications at small scale
Room AS3		Organized & chaired by Huiquan Wang / Zhejiang Univ, CN
14:00	Study on silicon based 3D millimeter wave system in package technology Sun Hao / Shanghai Inst of Microsystem and Information Tech (SIMIT), CAS, CN	
14:20	Oocyte image segmentation based on level set evolution and polar body detection Yongxin Zhang / Zhejiang Univ, CN	
14:40	Design of high-Q vibratory ring gyroscopes for micro-satellites Zhipeng Ma / Zhejiang Univ, CN	
15:00	Detection of TNT by SiNWs-FET based sensor Tie Li / Shanghai Inst of Microsystem and Information Tech (SIMIT), CAS, CN	
15:20	Advanced control system using in space Huiquan Wang / Zhejiang Univ, CN	
Regular session		Manipulation (I)
Room AS4		Chair: Masaru Takeuchi / Nagoya Univ, JP
14:00	A parasitic motionless piezoelectric actuated microgripper for micro/nano manipulation Tilok K. Das ^a , B. Shirinzadeh ^a , M. Ghafarian ^a , A. Al-Jodah ^a , Y. Tian ^b , D. Zhang ^c ^a Monash Univ, AU; ^b Univ of Warwick, UK; ^c Tianjin Univ, CN	
14:20	A high-throughput microfluidic platform for electrodeformation Rahul Singh Kotesa , R. Gupta, G.K. Ananthasuresh, P. Sen / IIS Bangalore, IN	
14:40	Soft continuous surface for micromanipulation driven by light-controlled hydrogels E. Choi ^a , H.-H. Jeong ^a , T. Qiu ^a , P. Fischer ^{a,b} , Stefano Palagi ^{a,c} ^a MPI for Intelligent Systems, DE; ^b University of Stuttgart, DE; ^c IIT, Pontedera, IT	
15:00	Magnetic self-assembly of toroidal microstructures by shaking for micro-tissue fabrication / Masaru Takeuchi ^a , M. Iriguchi ^b , M. Hattori ^b , E. Kim ^b , A. Ichikawa ^b , A. Hasegawa ^b , Y. Hasegawa ^a , T. Fukuda ^{b,c} ^a Nagoya Univ, JP; ^b Meijo Univ, JP; ^c Beijing Inst of Tech (BIT), CN	
15:20	V-shaped and Z-shaped SU-8 micro-tweezers with in-plane displacement for micromanipulation Rodica Voicu ^a , C. Tibeica ^a , M. Al Zandi ^b , A. Potekhina ^b , C. H. Wang ^b ^a National Inst for R&D in Microtech, RO; Heriot-Watt Univ, Edinburgh, UK	
15:40	Robotic optical-micromanipulation platform for teleoperated single-cell manipulation Edison Gerena ^a , F. Legendre ^a , Y. Vitry ^b , S. Régnier ^a and S. Haliyo ^a ^a Sorbonne Univ, FR; ^b Univ Libre de Bruxelles, BE	

Technical Program: 3. Day – July 4

3. Day – July 4: Plenary sessions		Room AS2
08:50 – 09:40 Keynote talk		
09:40 – 10:40 Plenary talks		
Chair: Kornel Ehmann / Northwestern Univ, US		
08:50	From nano fabrication to nano sensors by MEMS technology Tie Li Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN	
09:40	Tumbling magnetic microrobots for biomedical applications C. Bi, E. Niedert, G. Adam, E. Lambert, L. Solorio, C. Goergen, David J. Cappelleri Purdue Univ, US	
10:10	Powering microrobots: From fundamentals to applications Peer Fischer Max Planck Inst for Intelligent Systems, Stuttgart, DE	
16:20 – 17:20 Plenary talks		
Chair: Han Huang / Univ of Queensland, AU		
17:20 – 18:30 Closing & Awards ceremony		
16:20	Adhesion and friction of hard elastic coatings at nanoscale: Foundations and applications for nanomanufacturing Valentin L. Popov Technische Universität Berlin, DE	
16:50	Micro/nanosystems assembly via fluid joints Massimo Mastrangeli Delft Univ of Technology, NL	

3. Day – July 04:		Parallel technical sessions	11:00 – 13:00
Special session Room AS2		Micro and nano-manipulation, automation and robotics inside Electron Microscopes Organized & chaired by Mokrane Boudaoud / Sorbonne Univ, FR Cédric Clévy / FEMTO-ST, Burgundy Franche-Comté Univ, FR	
11:00	In-situ versatile characterization of carbon nanotubes using nanorobotics Cédric Clévy^a , B. Sauvet ^a , J.-Y. Rauch ^a , O. Lehmann ^a , F. Marionnet ^a , P. Lutz ^a , L. Beccacece ^b , S. Xavier ^b , R. Aubry ^b , A. Ziaei ^b , C. Prévot ^b , G.J. Laurent ^a ^a FEMTO-ST, FR; ^b Thales Research and Technology, FR		
11:20	EBiC-based drift compensation for an automated EBiD fabrication process Malte Bartenwerfer , S. Fatikow / Univ of Oldenburg, DE		
11:40	Nanoscale adhesion and its characterization Han Huang / Univ of Queensland, AU		
12:00	Construction and application of composite nanotweezers for creating nanostructures for the nanoelectronics devices Peter Lega / Kotelnikov Inst of Radioengineering and Electronics, RAS, RU		
12:20	Calibration of a class of 3 DOF serial micro robotic systems through SEM vision: Application to vertical AFM tip landing Jonathan Cailliez , M. Boudaoud, S. Régner / Sorbonne Univ, FR		
Special session Room AS1		Medical applications of microrobotics Organized & chaired by Eric Diller / Univ of Toronto, CA Hongsoo Choi / Daegu-Gyeongbuk Inst of Sci&Tech (DGIST), KR	
11:00	Targeted Brain Stimulation scheme using magnetic nanoparticles Jung Won Yoon / Gwangju Inst of Sci and Tech, KR		
11:20	Electromagnetic actuation scheme for swarm of magnetic nanoparticles steering in multi-bifurcation Ali Kafash Hoshidar^a , T.-A. Le ^b , J. Yoon ^b ^a Univ of Leeds, UK; ^b Gwangju Inst of Sci and Tech, KR		
11:40	Tethered and untethered microrobotic tools for minimally invasive surgery and sampling Eric Diller / Univ of Toronto, CA		
12:00	Cell transportation and transplantation using scaffold-type microrobots Hongsoo Choi / Daegu-Gyeongbuk Inst of Sci&Tech (DGIST), KR		
12:20	Untethered miniature Origami robots for medicine Shuhei Miyashita / Univ of Sheffield, UK		

3. Day – July 04:		Parallel technical sessions	11:00 – 13:00
Special session		Microwave Microscopy and nano characterization	
Room TU1		Organized & chaired by Olaf C. Haenssler / Univ of Oldenburg, DE	
11:00	Broadband conductive and dielectric properties by Scanning Microwave and Electrostatic Force Microscopy Georg Gramse / Johannes Kepler Univ Linz, AT		
11:20	Nanoscale quantitative imaging by Microwave Impedance Microscopy Xudong Chen / National Univ of Singapore, SG		
11:40	An inverted configuration for Scanning Microwave Microscopy Davide Mencarelli / Univ Politecnica delle Marche, IT		
12:00	Building a Near-Field Scanning Millimeter-wave Microscope integrated in a Scanning Electron Microscope P. Polovodov ^a , O.C. Haenssler ^b , D. Théron ^a , C. Boyaval ^a , S. Eliet ^a , G. Dambrine ^a , Kamel Haddadi ^a ^a CNRS-IEMN, Univ Lille, FR; ^b Univ of Oldenburg, DE		
12:20	Multi-target tracking for automated RF on-wafer probing based on template matching H. Li ^{a,b} , F.T. von Kleist-Retzow ^b , Olaf C. Haenssler ^b , S. Fatikow ^b , X. Zhang ^a ^a South China Univ of Tech, CN; ^b Univ of Oldenburg, DE		
Special session		Smart sensors for micro-nano robotics (II)	
Room TU3		Organized & chaired by Tie Li Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN	
11:00	Nanoscale field emission characterization based on MEMS devices and focused ion beam etching Yuelin Wang Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN		
11:20	The effect of contact bump of MEMS tactile sensor on cross-axis coupling used for the robot; Linxi Dong / Hangzhou Dianzi Univ, CN		
11:40	Nanoscale sensors based on field emission mechanism in air Meng Liu , Y. Lei, Y. Yang, T. Li, Y. Wang Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN		
12:00	Aluminum nitride resonator and microsystem for near-zero power RF sensing Tao Wu / ShanghaiTech Univ, CN		
12:20	Millimeter wave sensor for robotic obstacle-detecting application Linpu Li, Xiaowei Sun Shanghai Inst. of Microsystem & Information Tech (SIMIT), CAS, CN		

3. Day – July 04:		Parallel technical sessions	11:00 – 13:00
Regular session		Design and fabrication (II)	
Room AS3		Chair: Kenn Oldham / Univ of Michigan, US	
11:00	Topology optimization of piezoelectric plate energy harvester under external in-plan force considering different boundary conditions Abbas Homayouni Amlashi , A. Mohand-Ousaid, M. Rakotondrabe / FEMTO-ST, FR		
11:20	Topology optimization of micro-robotic appendages combining piezoelectric, polymer, and silicon beams / A. Milojević ^a , V. Krokmal ^b , B. Wu ^b , Kenn Oldham ^b ^a Lappeenranta Univ of Tech, FI; ^b Univ of Michigan, US		
11:40	Simple fabrication of helical-shaped microrobot with NdFeB nanoparticle by self-rolling technique / Bobby A. Darmawan ^a , H. Li ^a , K.T. Nguyen ^a , S.-J. Kim ^a , S. Kim ^b , C.-S. Kim ^a , J.-O. Park ^a , E. Choi ^a ; ^a Chonnam Nat Univ, KR; ^b Illuminoid Inc, KR		
12:00	Design of a 3D vision-based micro-force sensing probe Georges Adam , D.J. Cappelleri / Purdue Univ, US		
12:20	Fully 3D micro, biocompatible, soft actuator using 3D-printed soluble mold S. Oh ^a , W. Jung ^b , Yongha Hwang ^b / ^a KRISO, Daejeon, KR; ^b Korea Univ, Sejong, KR		
12:40	Overview of lattice structure: Morphology, manufacturing and material aspect S. Shah ^a , Mohanish Shah ^b / ^a TSSM's BSCOER, IN; ^b MIT Acad of Eng, IN		
Regular session		Micro/Nano robots (II)	
Room AS4		Chair: Dan O. Popa / Univ of Louisville, US	
11:00	Concept validation for a novel stick-and-slip light-powered mobile micro-crawler Jordan F. Klotz , D. Wei, Z. Yang, R. Zhang, A. Sherehiy, M.N. Saadatzi, D.O. Popa Univ of Louisville, US		
11:20	Flexible material recognition sensor for robots / Zuowei Wang ^a , Q. Lin ^{a,b,c} , L. Zhao ^a , W. Jing ^a , C. Wang ^a , P. Yang ^a , N. Peng ^a , K. Yue ^a , Z. Jiang ^{a,b} ^a Xi'an Jiaotong Univ, CN; ^b Xiamen Inst of Tech, CN; ^c Xi'an JT Univ Suzhou Inst, CN		
11:40	Jumping micro robotic devices based on pre-strained Shape Memory crystals Vladimir I. Nikolaev , A.V. Soldatov, G.F. Malygin, A.V. Chikiryaka, S.I. Stepanov, S.A. Pulnev, A.I. Pryadko, V.M. Krymov / Ioffe Inst, Saint-Petersburg, RU		
12:00	New wing stroke and wing pitch approaches for milligram-scale aerial devices Palak Bhushan , C. Tomlin / Univ of California Berkeley, US		
12:20	Soft microrobots exploiting frictional hysteresis to crawl with one Degree-of-Freedom actuation in low-Reynolds environments / Charlie Maslen ^a , I. Rehor ^a , R. van Alst ^b , B. Eral ^c , W. Kegel ^b ; ^a VSCHT Praha, CZ; ^b Utrecht Univ, NL; ^c TU Delft, NL		
12:40	Control of planar motion of a magnetic microrobot using a novel electromagnetic actuation system M. Yousefi, A. Moradi, Hossein Nejat Pishkenari / Sharif Univ of Tech, IR		

3. Day – July 04:		Parallel technical sessions	14:00 – 16:00
Special session		High-precision mechatronic systems	
Room AS1		Organized & chaired by Qingsong Xu / Univ of Macau, SAR, CN	
14:00	Design and testing of a new compliant parallel-kinematic constant-force end-effector X. Zhang, Qingsong Xu / Univ of Macau, SAR, China		
14:20	A spatial design of a large stroke compliant XY nanomanipulator with cross-coupling error reduction Z. Liu ^a , Zhen Zhang ^a , P. Yan ^b ^a Tsinghua Univ, CN; ^b Shandong Univ, CN		
14:40	A modeling method of electromagnetic micromirror in random noisy environment Dong Ruili / Donghua Univ, CN		
15:00	A hybrid hysteresis and dynamics model for piezo-driven flexure-based mechanisms Yanding Qin ^a , H. Duan ^a , B. Shirinzadeh ^b ^a Nankai Univ, CN; ^b Monash Univ, AU		
15:20	Design and analysis of a novel active constant-force XYZ parallel stage X. Zhang, Qingsong Xu / Univ of Macau, SAR, China		
Regular session		Automation (II)	
Room TU3		Chair: František Mach/ Univ of West Bohemia, CZ	
14:00	Magnetic actuation of multiple robots by the coplanar coils system Jiří Kuthan , M. Juřík, F. Mach / Univ of West Bohemia, CZ		
14:20	Rapid mode-switching for acoustic manipulation Kourosh Latifi , A. Kopitca, Q. Zhou / Aalto Univ, FI		
14:40	Autonomous micromanipulation using uncalibrated visual servo control J.A. Piepmeier, H. ElBidweihy, M. Feemster, H. Biggs, Samara Firebaugh U.S. Naval Academy, US		
15:00	Deep Learning-based semantic segmentation of microscale objects E.U. Samani, W. Guo, Ashis G. Banerjee Univ of Washington, US		
15:20	Enhancing the capture efficiency of a micro-robotic swarm in targeted delivery using velocity control Akshatha Jagadish , M. Varma / Indian Inst of Sci, Bangalore, IN		

3. Day – July 04:		Parallel technical sessions	14:00 – 16:00
Special session		3D micro- and nano-manipulation, assembling technology and tools	
Room TU1		Organized & chaired by Victor Koledov & Svetlana von Gratowski Kotelnikov Inst of Radioengineering and Electronics, RAS, RU	
14:00	Contact micromanipulation in 3D Ebubekir Avci / Massey Univ, NZ		
14:20	Three-dimensional optical trapping of a plasmonic nanoparticle using low numerical aperture optical tweezers Oto Brzobohatý , M. Šiler, J. Trojek, L. Chvátal, V. Karásek, P. Zemánek Inst of Sci Instruments of the CAS, Brno, CZ		
14:40	3D nano-manipulation and nano-assembling by the smallest and the fastest shape memory alloy nano-tools / Victor Koledov ^a , S. von Gratowski ^a , A. Shelyakov ^b , P. Lega ^a , M. Cotta ^d , A. Orlov ^a , A. Frolov ^a , A. Irzhak ^{a,c} , A. Smolovich ^a ^a Kotelnikov Inst of Radioeng & Electronics, RAS, RU; ^b National Research Nuclear Univ MEPhI, RU; ^c Inst of Microelectronics Tech & High Purity Materials, RAS, RU; ^d Univ of Campinas, BR		
15:00	Design considerations for effective thermal management in mobile nanotweezers S. Ghosh, Ambarish Ghosh / Indian Inst of Sci, Bangalore, IN		
15:20	Design of microgrippers based on amorphous-crystalline TiNiCu alloy with two-way shape memory / Alexander V. Shelyakov ^a , N.N. Sitnikov ^b , K.A. Borodako ^{a,c} , V.V. Koledov ^c , I.A. Khabibullina ^b , S. von Gratowski ^c ^a National Research Nuclear Univ MEPhI, RU; ^b Keldysh Res Center, Moscow, RU; ^c Kotelnikov Inst of Radioeng & Electronics, RAS, RU;		
Regular session		Manipulation (II)	
Room AS4		Chair: Ivan Rehor / Univ of Chemistry & Tech, CZ	
14:00	Grasping analysis of a spherical self-adaptive gripper R. He, Y. He, Wenzeng Zhang / Tsinghua Univ, CN		
14:20	Hydrogel microcrawlers self-assembly into ordered solid sheets of tunable geometry / C. Maslen ^a , H.B. Eral ^b , F. Stepanek ^a , P. Cigler ^c , Ivan Rehor ^a ^a Univ of Chemistry & Tech, CZ; ^b Delft Univ of Tech, NL; ^c IOCB, CAS, CZ		
14:40	Analysis of quadrupole electromagnetic actuation system with movable cores Hyeonwoo Kee , H. Lee, H. Choi, S. Park / Daegu Gyeongbuk Inst of Sci & Tech, KR		
15:00	Capillary manipulation of flexible microfibers Y. Hua ^a , Z. Zhu ^a , Bo Chang ^{a,b} / ^a Shaanxi Univ of Sci & Tech, CN; ^b Aalto Univ, FI		
15:20	Hydrophilic/hydrophobic capillary pipette for precise droplet formation and transport / Antoine Barbot , D.J. Wales, G.-Z. Yang; Imperial College London, UK		

3. Day – July 04:		Parallel technical sessions	14:00 – 16:00
Regular session		Measurement and characterization	
Room AS3		Chairs: Florence Marchi / Univ Grenoble Alpes, FR Ioan-Alexandru Ivan / Univ Lyon, FR	
14:00	Measuring plastic deformation in epitaxial silicon after thermal oxidation K.V. Sweers, Reinier Kuppens , N. Tolou / Delft Univ of Tech, NL		
14:20	Analytical approximation of quantum mechanical tunneling and characterization of nano-scale heterojunction Double Gate Tunnel FETs S. Poorvasha, B. Lakshmi / Vellore Inst of Tech, Chennai, IN		
14:40	Characterization of micro/nano-rheology properties of soft and biological matter combined with a virtual reality haptic exploration C. Petit ^{a,b} , M. Kechiche ^b , I.-A. Ivan ^b , R. Toscano ^b , V. Bolcato ^a , E. Planus ^a , Florence Marchi ^a / ^a Univ Grenoble Alpes FR; ^b Univ Lyon, FR;		
15:00	Electrical modeling of MEMS sensor based on Movable Gate Field Effect Transistor for ultra-low force measurement Wendi Gao* , L. Zhao, W. Jing, Q. Lin, C. Wang, P. Yang, K. Yue, N. Peng, Z. Jiang Xi'an Jiaotong Univ, CN; *also with City Univ of Hong Kong, SAR, CN		
15:20	Haptic microcantilever-based metrological lab Bartosz Świadkowski ^a , W. Majstrzyk ^a , P. Kunicki ^a , A. Sierakowski ^b , T. Gotszalk ^a ^a Wroclaw Univ of Sci and Tech, PL; ^b Inst of Electron Tech, Warsaw, PL		
15:40	Precise scanner of magnetic field distribution Martin Vitek , M. Juřík, F. Mach / Univ of West Bohemia, CZ		