

**IS-EMD2011 Final Program**  
**(11th International Session on Electro-Mechanical Devices)**

**Conference date:** November 17 (Thu.) and 18 (Fri.), 2011

**Venue:** Akita University, Venture Business Laboratory, 2nd floor, Seminar Room

Address: 1-1 Tegata-Gakuen-machi, Akita, 010-8502, Japan

**Technical areas:** Basic Contact Phenomena, Theoretical Analysis, Arc Discharge and Related Phenomena, Sliding contacts, Relays, Connectors, Contactors and Circuit Breakers, Optical Interconnection, Sensing Devices, Automotive Applications, Signal Transmission, Lead Free Soldering, Reduce-Reuse-and-Recycle Techniques, Testing and Evaluation, Others

**Language:** English

**Registration Fee:** No registration fee (Proceedings will be purchased as Technical report of IEICE)

**Welcome reception: 16 (Wed.) 18:00 - 20:00,** Akita University Hall, 2F, ¥1,000/person

**Banquet: 17 (Thu.) 18:30 - 20:00,** Akita University Hall, 2F, ¥3,000 (¥1,000 for Student)

**Special luncheon meeting: 18 (Fri.) 12:30 - 13:30,** Akita University, General research building 2F, Luncheon ¥500  
"The biggest earthquake of east Japan and research"

12:30-12:50 "Action of the University in the disaster" ○Prof. Noboru Wakatsuki (IshinomakiSensyu University)

12:50-13:00 "Action of the Information system" ○Prof. Hideaki Sone (Tohoku University)

**Committees meeting: 17 (Thu.) 12:30-13:30,** Akita University, General research building 1F

**Sponsor:** The Technical Group on EMD of IEICE

**Co-sponsors:** Graduate School of Engineering and Resource Science, Akita University

Research and Engineering Society for Electromechanical Components and Contact Technology in Japan

IEEE EMC Society Sendai Chapter

Akita Society on Applied Electronics for 21st Century

**Financial support:** Intelligent Cosmos Academic Foundation,

Graduate School of Engineering and Resource Science, Akita University

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Secretary (Local): Yoshiki Kayano (Akita University), Secretaries (Liaison): Terutaka Tamai (RES-ESCCT), Hideaki Sone (Tohoku

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Secretary: Yoshiteru Abe

Committee Members: Seiji Asai, Hiroyuki Ishida, Mitsuo Ichiya, Shigeru Umemura, Mitsuru Kobayashi, Yasutoshi Komatsu, Masao Saito,

Osamu Sakaguchi, Kazuomi Sato, Yoshitaka Sugiyama, Hideaki Sone, Koji Takami, Hiroyasu Torazawa, Keisaku Nakano, Ryo Nagase,

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IS-EMD Web-site: <http://www.ieice.org/es/emd>

International attendee and Visa application: supported by E-side Corporation

**Special Issue of the IEICE Transactions via IS-EMD2011**

Call for papers for IEICE Transactions on Electronics Special Issue (September 2012) on "Recent Development of Electro-Mechanical Devices" is announced at [http://www.ieice.org/eng/s\\_issue/cfp/2012\\_9EC.pdf](http://www.ieice.org/eng/s_issue/cfp/2012_9EC.pdf)

The deadline for submission is **December 22, 2011**.

## Program

**Thu, Nov 17, 08:40 - 18:10**

08:40-08:45	Opening Remarks	
<b>Session 1</b>	Chair: Mingzhe Rong	
(1) 08:45-09:05	Reignition of Break Arcs Magnetically Blown-Out in a 450V DC Resistive Circuit	○Hitoshi Ono, Junya Sekikawa, Takayoshi Kubono (Shizuoka University, Japan)
(2) 09:05-09:25	Position and shape of break arcs driven by transverse magnetic field	○Tomoaki Sasaki, Junya sekikawa, Takayoshi Kubono (Shizuoka University, Japan)
(3) 09:25-09:45	Effect of Shapes of Contact Surfaces on Break Arcs Occurring between Electrical Contacts in which a Magnet Is Embedded	○Naoya Takeshita, Junya Sekikawa, Takayoshi Kubono (Shizuoka University, Japan)
(4) 09:45-10:05	Simulation Study on Arc Characteristics Driven by Magnetic Fields in a Sealed Relay	Xue Zhou, Weiting Zhai, ○Xinglei Cui, Huimin Liang (Harbin Institute of Technology, China)
(5) 10:05-10:25	Influence of Different Voltages on Arc Characteristics under Transverse Magnetic Field	○Zhai Guofu, Liu Yaqi, Jiang Hanyu, Cui Xinglei (Harbin Institute of Technology, China)
10:25-10:40	Break ( 15 min. )	
<b>Invited Talk 1</b>	Chair: Kiyoshi Yoshida	
(6) 10:40-11:10	Characteristics of Arc with Carbon Electrodes	○Erwann Carvou, Brian Mitchell, Nourredine Ben Jemaa, Jerome Praquin (University of Rennes 1, France), Mounir Djeddi, Zakaria Belhadja (Schneider Electric, France)
<b>Session 2</b>	Chair: Nobuhiro Kuga	
(7) 11:10-11:30	Electric Contact Welding a Review a Literature	Robert Daszkiewicz, ○Piotr Borkowski (Technical University of Lodz, Poland)
(8) 11:30-11:50	Electromechanical Properties of Dielectric Electroactive Elastomer Actuators Based on Alumina/Natural Rubber	Araya Onthong, Sudarat Datsanae, ○Nuchnapa Tangboriboon (Kasetsart University, Thailand)
(9) 11:50-12:10	Rotation Phenomena of Speckle Patterns Observed in an Output Light Spot from an Optical Fiber	○Yusuke Takahashi, Muneki Kawahara, Makoto Hasegawa (Chitose Institute of Science & Technology, Japan)
(10) 12:10-12:30	An Experimental Study on Changes of Speckle Patterns Caused by Load Application onto an Optical Fiber	○Muneki Kawahara, Yusuke Takahashi, Makoto Hasegawa (Chitose Institute of Science & Technology, Japan)
12:30-13:30	Lunch (60 min.) Steering and Organizing Committees meeting (foreign participant will be invited for the guest) (General Research Building, 1st floor)	
<b>Invited Talk 2</b>	Chair: Makoto Hasegawa	
(11) 13:30-14:00	Environmentally-Friendly Switches -- Arcing Phenomena in Vacuum and SF6 Substitutes --	○Shenli Jia, Xingwen Li, Zongqian Shi, Lijun Wang (Xi'an Jiaotong University, China)
<b>Session 3</b>	Chair: Terutaka Tamai	
(12) 14:00-14:20	Research on Contact Failure Mechanism in Static Electrical Contact	○Shouta Ogawa, Koichiro Sawa, Takahiro Ueno (Nippon Institute of Technology, Japan)
(13) 14:20-14:40	The Influence of Operating Conditions on the Contact Resistance Characteristics of Ag-SnO2 Material	Hongwu Liu, Ruiliang Guan, ○Nairui Yin, Yanfeng He (Changshu Switchgear Mfg. Co., Ltd.), Degui Chen (Xi'an Jiaotong University, China)
(14) 14:40-15:00	Dependence of Contact Resistance Distribution on Circuit Current after Occurrence of Break Arcs	○Yohei Yamanashi, Junya Sekikawa, Takayoshi Kubono, Katsuyoshi Miyaji (Shizuoka University, Japan)
15:00-15:15	Break ( 15 min. )	
<b>Session 4</b>	Chair: Yasuhiro Hattori	
(15) 15:15-15:35	The Effect of Transverse Magnetic Field on Arcing	Liu Yun, Xu Guangda, ○Li Zhenbiao, Zhao Laijun

	Duration of Electrical Contact	(Huazhong University of Science and Technology, China), Makoto Hasegawa (Chitose Institute of Science and Technology, Japan)
(16) 15:35-15:55	Analysis of the Characteristics of an AC Solenoid Magnetic Release with Permanent Magnet	OWang Qian, Li Xingwen, Chen Degui (Xi'an Jiaotong University, China )
(17) 15:55-16:15	The Influence of Back Gas Flow on the Interruption Performance of Low Voltage Circuit Breaker	ODegui Chen, Xingwen Li, Ruicheng Dai (Xi'an Jiaotong University, China)
(18) 16:15-16:35	The Static and Dynamic Analyses of Actuator with Branch Magnetic Circuit for Electronic Trip of Low-Voltage Circuit Breaker	ODegui Chen, Xingwen Li, Yingyi Liu, Kena Chen (Xi'an Jiaotong University, China)
16:35-16:50	Break (15 min. )	
<b>Session 5</b>	Chair: Piotr Borkowski	
(19) 16:50-17:10	An Experimental Study on Evaluation of Contact Surface Damages with an Optical Cross-Section Method	OKeisuke Takahashi, Makoto Hasegawa (Chitose Inst. of Science and Technology, Japan)
(20) 17:10-17:30	Contact Resistance Characteristics of Relays Operated in Vapors Evaporated from Cured Polymeric Products	ONanae Kobayashi, Makoto Hasegawa (Chitose Institute of Science and Technology, Japan), Yoshiyuki Kohno, Hiroshi Ando (Kaneka Corporation, Japan)
(21) 17:30-17:50	A Robust Solution for Hesitate Phenomenon in Closing Process of Sealed Electromagnetic Relay	ODeng Jie, Ye Xuerong, Ma Yue, Zhai Guofu (Harbin Inst. of Technology, China)
(22) 17:50-18:10	Design of Contact Performance Testing Setup for Relay Contact	O Xiaohua Wang, Tingting Cai, Mingzhe Rong (Xi'an Jiaotong University, China)

### Banquet (18:30 – 20:00) at Akita University Hall (Clair)

### Fri, Nov 18, 08:45 - 17:55

<b>Session 6</b>	Chair: Degui Chen	
(23) 08:45-09:05	Current Density Analysis in Contact Area by Using Light Emission Diode Wafer	OShigeru Sawada, Shigeki Tsukiji (Mie University, Japan), Terutaka Tamai (ElconTech, Japan), Yasuhiro Hattori (ANTech, Japan)
(24) 09:05-09:25	Estimation of Contact Resistance of Tin Plated Contacts by Fretting Corrosion	OSoshi Masui, Shigeru Sawada (Mie University, Japan), Terutaka Tamai (ElconTech, Japan), Yasuhiro Hattori (ANTech, Japan), Kazuo Iida (Mie University, Japan)
(25) 09:25-09:45	Deformation of Crystal Morphology in Tin Plated Contact Layer caused by Loading	OTerutaka Tamai (ElconTech, Japan), Shigeru Sawada (Mie University, Japan), Yasuhiro Hattori (AN Lab., Japan)
(26) 09:45-10:05	Stress-Strain Response of Copper-Based Spring Materials under Forward and Reverse Deformations and Its Mathematical Description 2	OYasuhiro Hattori, Kingo Furukawa (ANTech, Japan), Fusahito Yoshida (Hiroshima University, Japan)
(27) 10:05-10:25	Research on Fretting Wear Characteristics of Contact Material Induced by High Frequency Vibration	Wanbin REN, OSongjun MA, Peng Wang (Harbin Institute of Technology, China)
10:25-10:40	Break ( 15 min. )	
<b>Invited Talk 3</b>	Chair: Yoshiki Kayano	
(28) 10:40-11:10	High-Speed Connector and Cable Design – Signal Integrity and Electromagnetic Interference Considerations –	OJun Fan (Missouri University of Science and Technology, USA)
<b>Session 7</b>	Chair: Koichiro Sawa	
(29) 11:10-11:30	Detection of Second Harmonic Ultrasonic Components for Evaluation of Solids Interface	OTakayuki Harada, Makoto Fukuda, Kazuhiko Imano (Akita University, Japan)
(30) 11:30-11:50	Effect of Inductance at Connector Contact Boundary on Common-mode Current from	OKazuki Matsuda, Yu-ichi Hayashi, Takaaki Mizuki, Hideaki Sone (Tohoku University, Japan)

Interconnected Devices

- (31) 11:50-12:10 Simulation Method of Passive Intermodulation caused by a Short Source in Standing Wave ○Daijiro Ishibashi, Keita Hoshino ,Nobuhiro Kuga (Yokohama National University, Japan)
- (32) 12:10-12:30 Supported varistor overvoltage limiter with high energy-consuming ability and high durability for DC high voltage systems Grzegorz Drygala, ○Piotr Borkowski (Technical University of Lodz, Poland)

12:30-13:30 **Special Luncheon Meeting:** General Research Building, 2nd floor  
**“The biggest earthquake of east Japan and research”**  
 12:30-12:50 “Action of the University in the disaster” ○Noboru Wakatsuki (IshinomakiSensyu University)  
 12:50-13:00 “Action of the Information system” ○Hideaki Sone ( Tohoku University)  
 (Luncheon Fee: 500yen)

**Invited Talk 4** Chair: Hiroshi Inoue

- (33) 13:30-14:00 Analysis and Measurement Technique of Signal Transfer Characteristics in MEMS Probe Card Hyeonju Bae, Luong Duc Long, ○Wansoo Nah (Sungkyunkwan University, Korea)

**Session 8** Chair: Junya Sekikawa

- (34) 14:00-14:20 The Experimental Research of Liquid Metal Current Limiter ○Fei Yang, Mingzhe Rong, Hailong He, Yiyang Liu, Yi Wu (Xi'an Jiaotong University, China)
- (35) 14:20-14:40 An Experiment on Carbon Commutator and Brush Wear by Arc Discharge ○Liu Liqing, Koichiro Sawa, Takahiro Ueno (Nippon Institute of Technology, Japan)
- (36) 14:40-15:00 Research on Optimization Design of UHF-Partial Discharge Sensor in GIS Mingzhe Rong, ○Tianhui LI, Chen Zheng, Xiaohua Wang (Xi'an Jiaotong University, China)
- (37) 15:00-15:20 The Simulation and Experimental Research of Arc Motion in DC Air Circuit Breakers ○Yi Wu, Mingzhe Rong, Zhigang Ren, Fei Yang (Xi'an Jiaotong University, China)
- (38) 15:20-15:40 Electrode Mass Change of AgNi Contacts for Electromagnetic Contactor -- Influence of Voltage when only Break Arc is Generated -- ○Kiyoshi Yoshida, Koichiro Sawa (Nippon Institute of Technology, Japan), Kenji Suzuki, Masaaki Watanabe, Hideki Daijima (Fuji Electric, Ltd, Japan)

15:40-15:55 Break ( 15 min. )

**Session 9** Chair: Hideaki Sone

- (39) 15:55-16:15 Degradation Phenomenon of Electrical Contacts using a Micro-Sliding Mechanism -- Minimal Sliding Amplitudes estimated under some conditions by the Mechanism (18)-- ○Shin-ichi Wada, Keiji Kishida, Masahiro Kawanobe, Sainndaa Norovling, Naoki Masuda, Akira Ishiguro, Kunio Yanagi, Hiroaki Kubota (TMC, Japan), Koichiro Sawa (Nippon Institute of Technology, Japan)
- (40) 16:15-16:35 Experimental Analysis of Transient Phenomena from Metal Melting to Electric Discharge during Breaking Operations of Electric Contacts ○Takayuki Kudo, Noboru Wakatsuki (Ishinomaki Senshu University, Japan)
- (41) 16:35-16:55 Arc Discharge Affected by Pressure in Relay Housing ○Kazuaki Miyanaga, Yoshiki Kayano, Hiroshi Inoue (Akita University, Japan)
- (42) 16:55-17:15 Voltage Fluctuation of Arc Discharge Affected by Pressure in Relay Housing Kazuaki Miyanaga, ○Yoshiki Kayano, Hiroshi Inoue (Akita University, Japan)

17:15-17:20 Closing Remarks

(6), (34), (37) :supplementary volumes will be delivered at the conference site

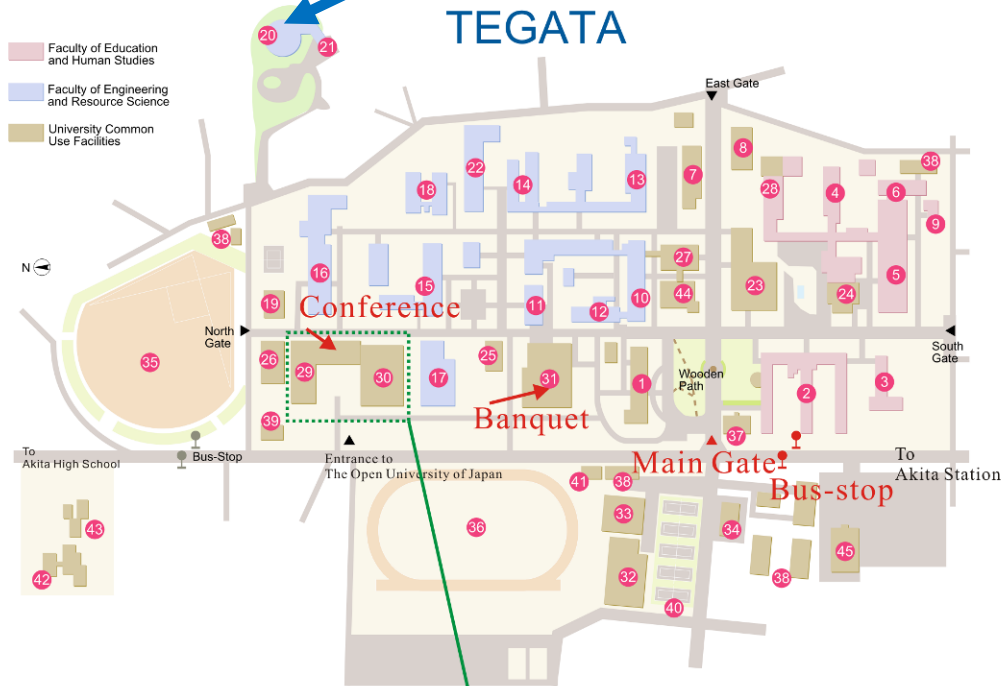
**Announcement for Speakers**

General Talk Each speech will have 15 minutes for presentation and 5 minutes for discussion.

Invited Talk Each speech will have 20 minutes for presentation and 10 minutes for discussion.

# Campus Map

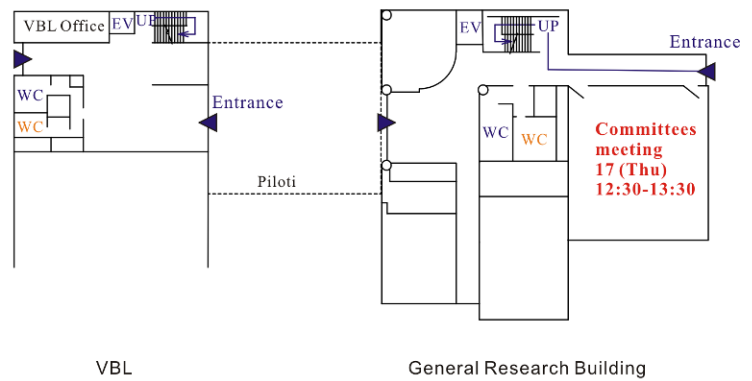
Free for the participant of IS-EMD2011



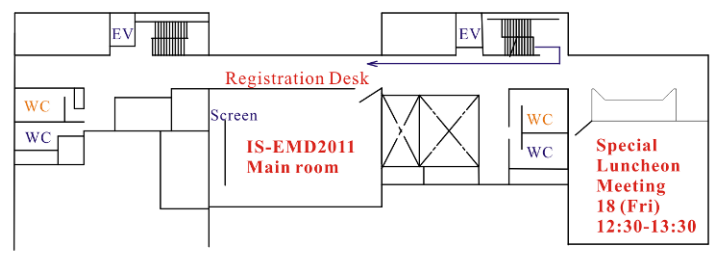
## Map of Tegata Campus

- 1 Administrative Office Bldg., Admission Division, Office of Teaching License Extension, Public Contribution Division, Center for Evaluation, Support Office for Gender Equality
- 2 Faculty of Education and Human Studies Bldg. No.1 (Administration Bldg.)
- 3 Faculty of Education and Human Studies Bldg. No.2 (Music Bldg.)
- 4 Faculty of Education and Human Studies Bldg. No.3
- 5 Faculty of Education and Human Studies Bldg. No.4
- 6 Faculty of Education and Human Studies Bldg. No.5
- 7 General Education Bldg. No.1, International Exchange Center (International Exchange Division, Multicultural Lounge)
- 8 General Education Bldg. No.2
- 9 Center for Educational Research and Practice
- 10 Faculty of Engineering and Resource Science Bldg. No.1 (Administration Bldg.)
- 11 Faculty of Engineering and Resource Science Bldg. No.1 (Dept. of Electrical and Electronics Engineering / Dept. of Civil and Environmental Engineering)
- 12 Faculty of Engineering and Resource Science Bldg. No.1 (Dept. of Electrical and Electronics Engineering)
- 13 Faculty of Engineering and Resource Science Bldg. No.2 (Dept. of Earth Science and Technology)
- 14 Faculty of Engineering and Resource Science Bldg. No.2 (Dept. of Mechanical Engineering)
- 15 Faculty of Engineering and Resource Science Bldg. No.3 (Dept. of Materials Science and Engineering)
- 16 Faculty of Engineering and Resource Science Bldg. No.4 (Dept. of Engineering in Applied Chemistry / Dept. of Life Science)
- 17 Faculty of Engineering and Resource Science Bldg. No.5 (Dept. of Computer Science and Engineering)
- 18 Center for Geo-Environmental Science
- 19 Radioisotope Research Center
- 20 Mineral Industry Museum
- 21 Research Center for Potential Development of Disaster Prevention
- 22 Innovation Center for Engineering Design and Manufacturing
- 23 University Library
- 24 The 60<sup>th</sup> Anniversary Memorial Hall
- 25 University Health Center
- 26 Cooperative Research Center
- 27 General Information Processing Center
- 28 International Center for Research and Education on Mineral and Energy
- 29 **Venture Business Laboratory**, The Open University of Japan Akita Study Center
- 30 **General Research Bldg.**
- 31 **University Hall (Clair)**
- 32 Large Gymnasium
- 33 Small Gymnasium
- 34 Swimming Pool
- 35 Baseball Field
- 36 Athletic Filed
- 37 Information Center
- 38 Facility for Extra Curricular Activities
- 39 Japanese-style Archery Hall
- 40 Tennis Court
- 41 Clubhouse
- 42 International House
- 43 Residence Hall for Women (Tegata-Ryo)
- 44 Student Support Bldg. Center for Promotion of Education Research and Affairs, Student Support Center
- 45 Venture Incubation Center

## Floor Map (1F)



## Floor Map (2F)



Map: <http://www.akita-u.ac.jp/english/access.html>



Transportation Guide: About 6 min. bus ride from Akita Station West Bus Terminal



Note