

The 16th International Conference on
Solid-State Sensors, Actuators and Microsystems

TRANSNUCERS'11

JUNE 5-9, 2011 BEIJING, CHINA

FINAL PROGRAM

Sponsors: Chinese Academy of Sciences

Ministry of Science and Technology of China

National Natural Science Foundation of China

Beijing Municipal Science & Technology Commission



Technical Co-Sponsors:





Program at a Glance

SATURDAY, JUNE 4, 2011

14:00 - 18:00 Short Course Registration

SUNDAY, JUNE 5, 2011

07:30 - 09:00 Short Course Registration

09:00 - 12:00 Short Courses A-1, B-1, C-1 Room 306A, 306B, 307A

12:00 - 14:00 Lunch

14:00 - 17:00 Short Courses A-2, B-2, C-2 Room 306A, 306B, 307A

16:00 - 20:00 Registration

18:00 - 20:00 Welcome Reception China Science and Technology Museum

MONDAY, JUNE 6, 2011

07:30 - 18:00 Registration

08:30 - 09:45 Opening Ceremony & 30 Years' Anniversary

09:45 - 10:25 Plenary I - Hiroyuki Fujita, *University of Tokyo, Japan*

10:25 - 10:55 Break and Exhibit Inspection

10:55 - 11:35 Plenary II - Roger T. Howe, *Stanford University, USA*

11:35 - 12:15 Plenary III - Roland Zengerle, *University of Freiburg, Germany*

12:15 - 13:15 Luncheon

13:15 - 16:15 M3P Poster Session I

Mechanical/Physical Sensors and Microsystems

Chemical Sensors and Microsystems

Bio-Sensors and Bio-Microsystems

Medical Microsystems

Microfluidics

Materials, Fabrication and Packaging Technologies

Theory, Design and Test Methodology

Actuators

RF MEMS, Resonators, and Oscillators

Optical MEMS

**Nanoscale Materials And Fabrication, Devices and Systems
Energy and Power MEMS**

15:45 - 16:15

Break and Exhibit Inspection

16:15 - 18:00

PARALLEL ORAL SESSIONS

**SESSION I(1) –
Inertial Sensors**

**SESSION I(2) -
Power MEMS**

**SESSION I(3) -
Cell Handling &
Analysis**

**SESSION I(4) -
Chemical Sensors
I**

Room 309A

Room 309B

Room 311(A+B)

Auditorium

18:00 - 20:30

Evening Reception

Fourth Floor, CNCC

TUESDAY, JUNE 7, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

**SESSION II(1) –
CMOS-MEMS**

**SESSION II(2) –
RF-MEMS**

**SESSION II(3) –
Wet Assembly**

**SESSION II(4) –
Biomolecular
Sensing**

Room 309A

Room 309B

Room 311(A+B)

Auditorium

10:00 - 10:30

Break and Exhibit Inspection

10:30 - 12:15

PARALLEL ORAL SESSIONS

**SESSION III(1) –
Physical Sensors I**

**SESSION III(2)
– Resonators &
Oscillators**

**SESSION III(3)
– Bioprobes &
Biodevices**

**SESSION III(4)
– Wafer Level
Process**

Room 309A

Room 309B

Room 311(A+B)

Auditorium

12:15 - 13:15

Luncheon

13:15 - 16:15

T3P Poster Session II

Mechanical/Physical Sensors and Microsystems

Chemical Sensors and Microsystems

Bio-Sensors and Bio-Microsystems

Medical Microsystems

Microfluidics

Materials, Fabrication and Packaging Technologies

Theory, Design and Test Methodology

Actuators

RF MEMS, Resonators, and Oscillators

Optical MEMS

Nanoscale Materials And Fabrication, Devices and Systems

Energy and Power MEMS

15:45 - 16:15

Break and Exhibit Inspection

16:15 - 18:00

PARALLEL ORAL SESSIONS

SESSION IV(1) –Acoustics, Damping and Vibration Room 309A	SESSION IV(2) – Actuators Room 309B	SESSION IV(3) –Nanofabrication & Nanodevices Room 311(A+B)	SESSION IV(4) –Microfluidics I Auditorium
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18:00 - 19:00

Transducers Women Party Third Floor, CNCC

19:00

Adjourn for the Day

WEDNESDAY, JUNE 8, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

SESSION V(1) –3D Integration Room 309A	SESSION V(2) –Optofluidics Room 309B	SESSION V(3) –Bioanalysis Tools Room 311(A+B)	SESSION V(4) –Energy Harvesting Auditorium
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10:00 - 10:30

Break and Exhibit Inspection

10:30 - 12:15

PARALLEL ORAL SESSIONS

SESSION VI(1) –Materials for Nanodevices Room 309A	SESSION VI(2) – Optics Room 309B	SESSION VI(3) –Biomedical Microdevices Room 311(A+B)	SESSION VI(4) –Chemical Sensors II Auditorium
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12:15 - 13:15

Luncheon

13:15 - 16:15

W3P Poster Session III

- Mechanical/Physical Sensors and Microsystems**
- Chemical Sensors and Microsystems**
- Bio-Sensors and Bio-Microsystems**
- Medical Microsystems**
- Microfluidics**
- Materials, Fabrication and Packaging Technologies**
- Theory, Design and Test Methodology**
- Actuators**
- RF MEMS, Resonators, and Oscillators**
- Optical MEMS**
- Nanoscale Materials and Fabrication, Devices and Systems**
- Energy and Power MEMS**

15:45 - 16:15

Break and Exhibit Inspection

16:15 - 18:00

PARALLEL ORAL SESSIONS

SESSION VII(1) –Materials & Photonic Crystals	SESSION VII(2) –Materials & Characterization	SESSION VII(3) –Nanotubes & Nanowires	SESSION VII(4) –Devices for Cells & Microorganisms
Room 309A	Room 309B	Room 311(A+B)	Auditorium

18:00

Adjourn for the Day

19:00 - 21:30

Banquet

Banquet Hall, Ground Floor, CNCC

THURSDAY, JUNE 9, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

SESSION VIII(1) –Polymers in MEMS	SESSION VIII(2) –Wireless Systems & Components	SESSION VIII(3) –MEMS Gyroscopes	SESSION VIII(4) –Medical Devices & Systems
Room 309A	Room 309B	Room 311A	Room 311B

10:00 - 10:30

Break and Exhibit Inspection

10:30 - 12:15

PARALLEL ORAL SESSIONS

SESSION IX(1) –Physical Sensors II	SESSION IX(2) –Harsh Environmental Reliability	SESSION IX(3) –Displays, Scanners and Modulators	SESSION IX(4) –Microfluidics II
Room 309A	Room 309B	Room 311A	Room 311B

12:15 - 13:15

Conference Adjourns / Luncheon

13:30 - 17:00

Technical Tour



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Welcome to Transducers'11 in Beijing

Welcome to Beijing for Transducers'11, the 16th International Conference on Solid-State Sensors, Actuators and Micro Systems. The Transducers conference series started in 1981 in Boston, and continued biennially in Delft, Philadelphia, Tokyo, Montreux, San Francisco, Yokohama, Stockholm, Chicago, Sendai, Munich, Boston, Seoul, Lyon, Denver and Beijing. We are pleased to see that the Transducers field has kept growing vigorously since it was founded, and the conference is now ceremoniously greeting its 30 years anniversary.

Transducers'11 has received 1652 abstracts and 11 late news submitted from thirty-nine countries/regions. TPC members have worked hard in refereeing the submissions of record number. As a result, 214 papers have been selected for oral presentations and 529 papers have been selected for posters, making this conference the largest in Transducers history. In addition to that, 15 invited papers have been selected by extensive nomination and election. The technical program covers one plenary session, thirty six oral sessions and three poster sessions. An opening plenary session starts the meeting. Three plenary talks of exciting topics are given by distinguished experts. Four parallel sessions of oral presentation start with invited talks each day. The Digest of Technical Papers contains extended abstracts of all oral and poster presentations, and is provided in USB electronic version and three printed volumes. All the papers will be accessible through the IEEE Xplore digital library, and some selected papers will be published in Special Volumes of *Sensors and Actuators A or B*. "Outstanding Papers" will be elected from the papers presented at the conference, and the authors will be awarded.

In addition to the technical program, exhibitions are held in parallel with the technical sessions. Six short courses have been organized preceding the meeting, and a technical tour has been arranged after the meeting. To celebrate the 30 years anniversary of Transducers conference, some characteristic activities have been arranged. An interesting "Historical Exhibit" to highlight the 30 years' history will open to all the participants at the meeting, and the posters of the exhibit will be distributed to the conference participants. A series of exciting social events will provide attendees the opportunities for informal interaction and experiencing culture, food and entertainment. A welcome reception will be held in the evening of June 5 at the China Science and Technology Museum, together with the iCAN Contest. The conference will open on June 6, by coincidence on the Chinese traditional "dragon boat festival". An evening reception on the opening day, June 6 and a banquet on June 8 will be enriched with abundant Chinese features.

A remarkable feature of this meeting is that the Transducers conference is for the first time being held in a developing country. We believe that Transducers'11 in Beijing will have deep and wide influence. Beijing is the capital of China and is the country's political and cultural center. She is an ancient yet fast changing modern city, retaining colorful and harmonious mixture of ancient and modern civilizations. It has many wonderful cultural opportunities for discovering and enjoyment. The conference venue is at the China National Convention Center, which was constructed for the Olympic Games and hosted the Olympic fencing event in 2008, and it is located next to the Olympic Park, the Bird's Nest stadium and the Water Cube.

We would like to thank all the people who have contributed to the conference. We especially appreciate the work of all the chairs and members in various committees of Transducers'11. We are grateful to the enthusiastic support from the Transducers community all over the world and the painstaking work of the Transducers'11 team. We thank all the sponsors, exhibitors, authors and attendees of the conference.

Finally, we wish you will gain a lot from the conference and enjoy your time in Beijing.

Shanhong Xia
General Chair



Shanhong Xia

Minhang Bao
General
Co-Chair



Minhang Bao

Long-Sheng Fan
Technical
Program Chair



Long-Sheng Fan



General Information

Conference Location

All sessions and short courses will be held at China National Convention Center (CNCC).

Address: No. 8 Beichen West Road, Chaoyang District, Beijing 100105, China

Tel: +86-10-84373300

Fax: +86-10-84372008

Website: www.cnccchina.com

Dialing Codes

China International Country Code: +86

Beijing's Local Area Code: 10

Registration & Information Desk

A Registration Desk will be set-up in the Lobby of China National Convention Center (CNCC) during the following days and times:

June 4, Saturday.....	14:00 - 18:00
June 5, Sunday	07:30 - 20:00
June 6, Monday – June 8, Wednesday.....	08:30 - 18:00
June 9, Thursday.....	08:30 - 12:00

Any inquiries about the registration, social events, tours, etc. may be answered by approaching any of the staff at the registration desk. Participants may pick up their Conference kits, badges and invitations/coupons at the registration desk.

There is a Business Center located on the third floor, CNCC. It provides facilities and services, such as fax, IDD, EMS, photocopying and typing service in both English and Chinese at your own cost. Office Hours: 08:00-17:00.

Official Language

The official language of the conference is English and will be used for all presentations and printed materials.

Conference Bags

The conference bag will contain one copy of the Technical Digest on a USB flash drive, business card box, final program and envelop. Please put on your name tag immediately upon receipt.

Name Badges

All attendees must wear their name badges at all times to gain admission to all conference sessions, exhibits and receptions. In addition, coupons/invitations issued in your registration package must be presented for social events.

Downloading and Turn in the Slides

For technical reasons, **it is not possible to use your own computer for Oral Presentation**. Laptop (PC with Microsoft Windows), a laser pointer and microphone will be provided. You may submit your presentation during June 5-8, 2011 at the Speaker Ready Room, 307B, 3rd floor, CNCC. Please be sure to submit your PPT file at least one day before your presentation.

The following points are very important:

- (a) Your PPT file should be submitted according to the session it belongs to. Every file collection desk has a sign with session numbers at Speaker Ready Room. Please be sure to submit your presentation at the right collection desk with your session number.
- (b) Please name your PPT files as your Paper-ID.ppt, and please leave us your name and contact method (e.g. hotel room number). If your file can not work well, we will contact with you.
- (c) Your PPT file can be submitted at the following time:
June 5, 09:00 -22:00; June 6-8, 07:30 -18:00; June 9, 7:30 -10:00 (Emergency)

Posters

Authors are requested to set up their posters on the board designated for this purpose. The poster board will have your assigned number on it, so there is no need for the authors to include your number on your poster. **The posters may be installed on Sunday, June 5th, from 14:00 to 21:00.** Authors are asked to be present at their posters throughout the poster sessions during the times specified in the program. **All posters must be removed on Thursday, June 9th, from 10:30 to 12:00.** All posters left after 12:00 will be disposed. Please remove your poster promptly. The Executive Committee declines any responsibility for loss or damage of posters which have not been removed from the panel by the time indicated for this purpose.

Internet Service

Ten computers connected to Internet will be provided at the Internet Bar located in the Exhibition Hall on the third floor of CNCC. Free Wifi Area is also available on the Ground Floor, Third Floor and Fourth Floor of CNCC. The Wifi will be opened 24 hours on Monday, June 6th to Wednesday, June 8th and from 8:30 to 12:00 on Thursday, June 9th. The login information is:

SSID (Service set identifier, the name of Wireless LAN) : **transducers11** password: **trans11beijing**

*Please note that the codes are case sensitive.

Cell Phones, Pagers & Watch Alarms

Out of courtesy to our speakers and other attendees, please turn off any cellular phones, pagers and watch alarms during sessions.

Cameras & Video Recorders

Cameras and video recorders and cellular phones are strictly prohibited in the sessions, poster presentations and the exhibition area.

Local Information:

Climate

June in Beijing is relatively hot and humid as summer paves its way. However, temperature can fluctuate between 17°C to 32°C (63°F to 89°F).

Electricity

The electric current used in China is 220V 50Hz. The hotels can provide 220V and 110V (shavers only) power outlets. Please note that plug adapters may be necessary.

Currency and Banking

RMB (Chinese yuan) is the only currency used in China. Money exchanges by cash or traveler's checks can be made at banks at the airport, hotels and tourist stores.

Banks usually open at 9:00 a.m. and close at 5:00 p.m. everyday of the week (including Saturdays and Sundays). Currency exchange services are available for the following foreign currencies: US Dollar, British Pound Sterling, Euro, Japanese Yen, Australian Dollar, Canadian Dollar, Hong Kong Dollar, Swiss Franc, Danish Krone, Norwegian Krone, Swedish Krone, Singapore Dollar, Malaysian Ringgit, and Macao Pataca. Smaller money exchange outlets may not accept all of these currencies.

Credit cards such as American Express, Diners Club, JCB, Master Card and Visa may be used for payments at hotels and tourist stores.

When visitors leave China, they can change the remaining amount of RMB back into foreign cash at the airport prior to their departure from China. But if they wish to do so, they have to show foreign currency conversion receipts. The exchange rate in early 2010 is USD 1 = CNY 6.8.

ATM Machine

Beijing is a very ATM friendly city. There are many banks with many ATMs. Only about 50% of these accept foreign cards. The main foreign friendly ATMs are controlled by the Bank of China. Bank of China ATMs work in both Chinese and English (depending on your card), use the latest equipment, and are pretty easy to find. Also, the connection to the overseas banking network tends to have a high down time.

Insurance

The organizers do not accept any liability for personal accidents or loss or damage to the private property of any participants during the workshop or indirectly arising from attending the workshop. It is advisable that participants should take adequate travel and health insurances before leaving their own countries.

Air Ticket Reconfirmation

Departure air ticket (both international and domestic) should be reconfirmed 72 hours in advance. Calling the airline office in Beijing could make it. But these offices do not work in weekend.

Safety and Security

Security is difficult to judge as the reporting of crime is not as extensive as you would find in many other countries. The general impression you get though, is that the streets are very safe. Without a doubt the biggest danger you face when visiting Beijing is being involved in some kind of traffic accident. Crossing the road is an often frightening experience, and so is riding in a taxi for most foreign tourists. There are many unwritten rules and customs about traffic but the average tourist is completely unaware of these and just knows fear and confusion.

The next is pickpockets. Although none of us here has experienced this, and its nowhere near as big as a problem as in mainland Europe, Beijing people consider this one of their biggest crime problems. Pickpockets usually operate on crowded buses but do not tend to be as organized as in other countries. Be assure that you have one copy of first page and visa page for your passport and seperately kept.

As anywhere, leaving your bag or coat unattended or out of your direct line of sight is not recommended. We hear that places like Starbucks and KFC are famous for people having their bag taken from beside their seats.

Tipping

Tipping is discouraged by authorities and is not required in China - even at upscale restaurants and hotels. It is also not expected that you tip the taxi drivers. However, in hotels and during group travels, tipping is practiced for porters and tour guides.



Social Events

Welcome Reception

- 18:00-20:00, June 5, Sunday
- China Science and Technology Museum(No.5 Beichen East Road, Chaoyang District)
(15mins walking distance from CNCC, Shuttle bus available from 17:00-20:30)

In the evening of Sunday, June 5, 2011, a Welcome Reception will be hold at the China Science and Technology Museum. Take an opportunity to socialize with other attendees and guests while enjoying the museum's Chinese traditional exhibitions, including Seismograph, Chime bells, Chinese acupuncture and moxibustion etc. "The Glory of China" themes of displays will also give you sensuous pleasure and treat.

Meanwhile, you will have chance to participant in iCAN Contest (International Contest of Applications in Nano-micro technologies) and vote for 30 teams with their innovation projects from 15 countries. The iCAN contest will start from 9:00 till 20:30, including Project Show, Presentation, Voting, Show of 15 countries. iCAN is free open to public.

"Welcome Reception" is free for all participants of Transducers'11.

The China Science and Technology Museum is admission free to all registered participants of Transducers'11 during the conference period.

Evening Reception

- 18:00-20:30, June 6, Monday
- Fourth Floor , CNCC (China National Convention Center)

In the evening of Monday, June 6, 2011, an Evening Reception will be hold at CNCC, and will be enriched with abundant Chinese features.

June 6 is by coincidence the day of Duanwu (or Dragon Boat Festival) , a traditional Chinese festival in memory of a famous poet, Chu Yuan. For 2500 years, eating zong zi (glutinous rice wrapped to form a pyramid using bamboo leaves) and racing dragon boats on the festival day have become a custom for Chinese people.

Except eating Zongzi, other fun programs of Chinese culture will also be prepared for your enjoyment on site, for example shadow show, Chinese dress show, Diabolo Exercise, Chinese music performance, hand making and so on. Please come and have an enjoyable Chinese night.

iCAN award ceremony: There are over 30 teams from 15 countries and regions participating in iCAN for the award of Innovation Applications of Micro-Nano technologies. Who will be the winner? Answer in the Evening Reception.

Transducers Women Party

- 18:00-19:00, June 7, Tuesday
- Third Floor , CNCC

There will be a "Women in Transducers" activity at the Transducers'11 conference, which is sponsored by OAI. The activity will be a special tea party (18:00-19:00 on June 7), providing an opportunity for the women attendees to meet together, have drinks and snack (free for registered women participants).

Banquet

- 19:00-21:30, June 8, Wednesday
- Banquet Hall, Ground Floor, CNCC

Transducers'11 Banquet will be held in the evening of Wednesday, June 8, 2011. There will be multiple Chinese foods and gorgeous theatrical performances.

☞ **Outstanding Paper Award:** "Outstanding Papers" will be elected from the papers presented at the conference, and the authors will be awarded.

☞ Delicious Chinese food

☞ **High-light of Show:** Thousand-hand Bodhisattva dance will bring you beautiful visual, Butterfly Lovers Violin is showing your tenderness, and Chinese Kung Fu will lift your spirits. Being the quintessence of Chinese culture, Beijing opera will get you drunk. Chinese acrobats are indispensable to the show. In particular, all of members can do the Yanko dance, and take time to indulge.

If you want to know more about Chinese culture, know the leading scientists and the future MEMS stars, DO NOT miss this super banquet!

The price for the banquet ticket is RMB340 (about \$50.00) for registered participant.

Luncheon

- 12:15-13:15, June 6(Monday)-June 9 (Thursday)
- Ballroom, Ground Floor , CNCC

Technical Tour

- 13:30-17:00, June 9

At June 9th afternoon, there is one technical tour open for Transducers'11 attendees, which will go through the major micro-nano research centers in Beijing area, including Institute of Electronics (Chinese Academy of Science), Peking University (PKU) and Tsinghua University (THU), each place about 40mins.

Please sign up at registration desk during June 4-8, and get on Technical Tour bus at June 9th 13:30 at CNCC, the bus will go around IE-PKU-THU.



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Minhang Bao, Fudan University, China

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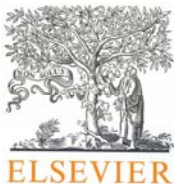
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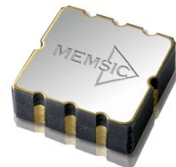
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Exhibits are located on the Third Floor, CNCC. Please refer to the floor plan of Level 3, CNCC.

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June 5, 2011	08:30-17:00	Exhibition setup
June 6-8, 2011	08:30-17:00	Exhibition
June 9, 2011	13:00	Exhibition removal

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Transducers 2013.....Booth No. 05

Transducers 2013 Conference

[Http://www.transducers-eurosensors2013.org](http://www.transducers-eurosensors2013.org)

Barcelona, Catalonia (Spain), June 16-20, 2013

Venue : CCIB Barcelona International Convention Centre

Transducers 2013 Announcing:

We are looking forward to see you in Barcelona, Catalonia (Spain) for enjoying all together science and technology in the field of solid-state sensors, actuators and microsystems as well as the charming atmosphere and warm ambient of a Mediterranean lovely place. Recent progress in physical, chemical and biological sensors including the most advanced technologies in micro/nano fabrication, packaging, design, power MEMS and innovative applications as integrated systems presented during the conference. The Abstract submission deadline is December 2nd, 2012.

Transducers 2015.....Booth No. 06

Transducers 2015 Conference

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Short Courses

Six short courses in selected areas will be offered on Sunday, June 5, 2011 (the on-site registration day of the conference). Renowned experts have been invited to teach the short courses.

The six short courses are divided into three series:

- (A) Design & Modeling,
- (B) Fabrication & Packaging,
- (C) Microfluidics & Biomedical microsystems.

Each course series contain two short courses; one in the morning and another in the afternoon. The detail is as follows:

Course A-1 (9:00 am -12:00am, June 5, 2011) **Room 306A, Third Floor, CNCC**
Design and Analysis of Resonant Micro-Electro-Mechanical Devices
 Lecturer: Prof. Farrokh Ayazi, Georgia Institute of Technology, USA

Course B-1 (9:00 am -12:00am, June 5, 2011) **Room 306B, Third Floor, CNCC**
Advanced Fabrication of MEMS & BIOMEMS and Carbon-MEMS/NEMS
 Lecturer: Prof. Marc Madou, University of California at Irvine, USA

Course C-1 (9:00 am -12:00am, June 5, 2011) **Room 307A, Third Floor, CNCC**
Microfluidics: Device Science and Technology
 Lecturer: Prof. Yitshak Zohar, University of Arizona, USA

Course A-2 (2:00 pm -5:00 pm, June 5, 2011) **Room 306A, Third Floor, CNCC**
MEMS Design Using Modeling and Simulation Methods
 Lecturer: Prof. Yie He and Dr. Joe Johnson, Intellisense Software Corp., USA

Course B-2 (2:00 pm -5:00 pm, June 5, 2011) **Room 306B, Third Floor, CNCC**
TSV/3D Integration Technology and Its Applications to MEMS Packaging
 Lecturer: Dr. Daniel Shi, ASTRI, Hong Kong

Course C-2 (2:00 pm -5:00 pm, June 5, 2011) **Room 307A, Third Floor, CNCC**
Lab-on-a-chip technologies for applications in the life sciences
 Lecturer: Prof. Jörg P. Kutter, DTU, Denmark



Technical Program Information

The technical program consists of three plenary sessions, thirty-six oral sessions of contributed papers and three poster sessions.

Plenary Sessions

The plenary sessions will be held Monday morning starting at 09:45.

Plenary I - Hiroyuki Fujita, *University of Tokyo, Japan*

Plenary II - Roger T. Howe, *Stanford University, USA*

Plenary III - Roland Zengerle, *University of Freiburg, Germany*

Parallel Oral Sessions

Each day papers will be presented in four parallel sessions. There will be a total of thirty-six oral sessions throughout the four days of the Conference.

Poster Sessions

Three poster sessions will be held on the Ground Floor of CNCC. Posters will be on display from Monday (June 6) at 13:15 through Wednesday (June 8) 16:15. All poster papers are listed with their assigned number and day that they are on display. Authors will be available for questions during their appointed time.

Guide to Understanding Paper Numbering

Each paper in the technical program is assigned a unique number which clearly indicates when and where the paper is presented. The number of each paper is shown before the paper title.

Typical Paper Number: M3P.037

- The first letter (i.e., M) indicates the day of the Conference:
M = Monday T = Tuesday W = Wednesday Th = Thursday
- The second number (i.e., 3) indicates what time during the day the session is being presented:
1 = Early Morning 2 = Mid Morning 3 = Early Afternoon 4 = Late Afternoon
- The third letter (i.e., P) shows the room location of the paper:
A = Parallel Oral Session (1), Third Floor, CNCC
B = Parallel Oral Session (2), Third Floor, CNCC
C = Parallel Oral Session (3), Third Floor, CNCC
D = Parallel Oral Session (4), Third Floor, CNCC
P = Poster, Ground Floor, CNCC
- The number after the point (.) shows the number of the paper in the session in sequence starting at 1.

Page Numbering

To assist you with finding the paper in the Technical Digest, we have provided the page number following each paper title.



Technical Program

SATURDAY, JUNE 4, 2011

14:00 - 18:00	Short Course Registration
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SUNDAY, JUNE 5, 2011

07:30 - 09:00	Short Course Registration	
09:00 - 12:00	Short Courses A-1, B-1, C-1	Room 306A, 306B, 307A
12:00 - 14:00	Lunch	
14:00 - 17:00	Short Courses A-2, B-2, C-2	Room 306A, 306B, 307A
16:00 - 20:00	Registration	
18:00 - 20:00	Welcome Reception	China Science and Technology Museum

MONDAY, JUNE 6, 2011

07:30 - 18:00	Registration	
08:30 - 09:45	Opening Ceremony & 30 Years' Anniversary	
09:45 - 10:25	Plenary I – Chair: Shuichi Shoji <i>Waseda University, Japan</i>	
	M001	NEW TRENDS OF MEMS/NEMS BASED ON HETEROGENEOUS PROCESS INTEGRATION – TOWARDS LIFE/GREEN INNOVATION <u>Hiroyuki Fujita</u> <i>CIRMM, The University of Tokyo, Tokyo, JAPAN</i>1
10:25 - 10:55	Break and Exhibit Inspection	
10:55 - 11:35	Plenary II - Chair Mark Allen <i>Georgia Institute of Technology, USA</i>	
	M002	VACUUM MICROSYSTEMS FOR ENERGY CONVERSION AND OTHER APPLICATIONS <u>Roger T. Howe</u> <i>Dept. of Electrical Engineering, Stanford University, Stanford, California, USA</i>7
11:35 - 12:15	Plenary III - Chair Helmut Seidel <i>University of Saarland, Germany</i>	
	M003	MICROFLUIDIC SOLUTIONS FOR MINIATURIZATION, INTEGRATION, AUTOMATION

AND PARALLELIZATION OF TESTS ON COMMERCIALY AVAILABLE INSTRUMENTS

R. Zengerle^{1,2,3}, D. Mark¹, D. Kosse¹, G. Roth^{1,2}, and F. von Stetten^{1,2}

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12:15 - 13:15

Luncheon

13:15 - 16:15

M3P Poster Session I

Mechanical/Physical Sensors and Microsystems

M3P.001

PHASE-LOCKED DRIVE LOOP WITH AMPLITUDE REGULATION BASED ONPHASE- SHIFTING FOR GYROSCOPES

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VERIFICATION OF THE PHASE-NOISE MODEL FOR MEMS OSCILLATORS OPERATING IN THE NONLINEAR REGIME

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MICRO DISK RESONATOR WITH ON-DISK PIEZOELECTRIC THIN FILM TRANSDUCERS FOR INTEGRATED MEMS UBIQUITOUS APPLICATIONS

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M4B.006	<p>GREEN VEHICLE SHOCK ABSORBER: MICROMACHINED WAVY SHAPED PIEZOELECTRIC CUSHION ENERGY HARVESTER AND ITS POWER GENERATING DEMONSTRATION BASED ON REAL NAVIGATION Guo-Hua Feng and Min-Yiang Tsai <i>Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan</i></p>	739
M4B.007	<p>LARGE ARRAY ELECTROSPUN PVDF NANOGENERATORS ON A FLEXIBLE SUBSTRATE Jiyoung Chang and Liwei Lin <i>Department of Mechanical Engineering, Berkeley Sensor and Actuator Center, University of California at Berkeley, Berkeley, CA USA</i></p>	743
SESSION I(3) – Cell Handling & Analysis		Room 311(A+B)
Session Chairs: Tianhong Cui <i>University of Minnesota, USA</i> Jens Ducree <i>Dublin City University, Ireland</i>		
M4C.001	<p>SPECIFIC CELL CAPTURE AND TEMPERATURE-MEDIATED RELEASE USING SURFACE-IMMOBILIZED APTAMERS IN A MICROFLUIDIC DEVICE Jing Zhu¹, ThaiHuu Nguyen¹, Renjun Pei², Milan Stojanovic² and Qiao Lin¹ ¹<i>Department of Mechanical Engineering, Columbia University, New York, NY, USA</i> ²<i>Department of Medicine, Columbia University, New York, NY, USA</i></p>	751
M4C.002	<p>SINGLE CELL REAL TIME SECRETION ASSAY USING AMORPHOUS FLUOROPOLYMER MICROWELL ARRAY Y. Shirasaki^{1,2}, A. Nakahara², N. Shimura¹, M. Yamagishi¹, J. Mizuno², O. Ohara^{1,3} and S. Shoji² ¹<i>RCAI, RIKEN, Kanagawa, Japan</i> ²<i>WASEDA Univ., Tokyo, Japan</i> ³<i>Kazusa DNA Res. Inst., Chiba, Japan</i></p>	755
M4C.003	<p>MEMS MASS SENSORS WITH UNIFORM SENSITIVITY FOR MONITORING CELLULAR APOPTOSIS K. Park^{*1,2}, L. Millet^{*1,2}, N. Kim³, H. Li³, K. J. Hsia^{2,3,4}, N. R. Aluru^{2,3,5} and R. Bashir^{1,2,4} ¹<i>Department of Electrical and Computer Engineering,</i> ²<i>Micro and Nanotechnology Laboratory,</i> ³<i>Department of Mechanical Science and Engineering,</i> ⁴<i>Department of Bioengineering,</i> ⁵<i>Beckman Institute of Advanced Science and Technology, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801, USA</i></p>	759
M4C.004	<p>MECHANICAL STIMULATOR OF CULTURED VASCULAR ENDOTHELIAL CELL FOR INVESTIGATION OF DRUG PERMEABILITY OF BLOOD VESSEL A. Shunori¹, K. Shimizu^{2,3}, M. Hashida^{2,4}, and S. Konishi^{1,2,3} ¹<i>Department of Micro System Technology, Ritsumeikan University, Japan</i> ²<i>Institute for Innovative NanoBio Drug Discovery and Development, Kyoto University, Japan</i> ³<i>Ritsumeikan-Global Innovation Research Organization, Ritsumeikan University, Japan</i></p>	

⁴Department of Drug Delivery Research, Kyoto University, Japan

M4C.005

PULSATILE SHEAR STRESS AND HIGH GLUCOSE CONCENTRATIONS INDUCED REACTIVE OXIGEN SPECIES PRODUCTION IN ENDOTHELIAL CELLS

J. Q. Yu¹, L. K. Chin¹, Y. Fu¹, T. Yu², K. Q. Luo² and A. Q. Liu¹

¹School of Electrical & Electronic Engineering

²School of Chemical & Biomedical Engineering, Nanyang Technological University, Singapore 639798

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M4C.006

PROTOZOON CLASSIFICATIONS BASED ON SIZE, SHAPE AND REFRACTIVE INDEX USING ON-CHIP IMMERSION REFRACTOMETER

L. K. Chin¹, T. C. Ayi², P. H. Yap² and A. Q. Liu¹

¹School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798

²Defence Medical & Environmental Institute, DSO National Laboratories, Singapore 117510

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M4C.007

DIAGNOSTIC DEVICE FOR COW MASTITIS BASED ON THE DETECTION OF SUPEROXIDE SECRETED FROM NEUTROPHILS

S. Kimura, J. Fukuda, and H. Suzuki

Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, JAPAN

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SESSION I(4) – Chemical Sensors I

Auditorium

Session Chairs: **Andreas Hierlemann** *ETH Zurich, Switzerland*

Ellis Meng *University of Southern California, USA*

M4D.001

INTEGRATED SILICON-BASED CHEMICAL MICROSYSTEM FOR PORTABLE SENSING APPLICATIONS

K.S. Demirci^{1,2}, L.A. Beardslee¹, S. Truax¹, J.-J. Su¹, O. Brand¹

¹School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA, USA

²currently at: Texas Instruments Inc.,

Dallas, TX, USA

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M4D.002

FREQUENCY-MULTI PLEXED COMBINATORY MASS SENSING WITH SINGLE DATA LINE FROM MULTIPLE INTEGRATED FILM BULK ACOUSTIC RESONATORS

S.J. Chen, A. Lin, L. Wang and E.S. Kim

University of Southern California, Los Angeles, USA

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M4D.003

ULTRA-LOW POWER PALLADIUM-COATED MEMS RESONATORS FOR HYDROGEN DETECTION UNDER AMBIENT CONDITIONS

J. Henriksson, L. G. Villanueva, and J. Brugger

Microsystems Laboratory, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

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M4D.004

LOCALLY SYNTHESIZED METAL OXIDE NANOWIRE-DEVICES AND THEIR GAS SENSING APPLICATIONS

D. Kim¹, M. A. Lim¹, D. Yang¹, Z. Li², C.O. Park³, and I. Park¹

¹Department of Mechanical Engineering & KI for the NanoCentury, KAIST, Daejeon, Korea

²Intelligent Infrastructure Laboratory, Hewlett Packard Laboratory, Palo Alto, CA, USA

³Department of Materials Science and Engineering, KAIST, Daejeon, Korea

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M4D.005

SINGLE CHIP NANOTUBE SENSORS FOR CHEMICAL AGENT MONITORING

Y. Liu¹, C.-L. Chen², V. Agarwal³, S. Sonkusale³, M. L. Wang¹, M. R. Dokmeci¹

¹Northeastern University, Boston, MA, USA

²University of California Los Angeles, Los Angeles, CA, USA

³Tufts University, Medford, MA, USA

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M4D.006

FIELD TESTING OF A RUGGED MEMS GAS CHROMATOGRAPH PROTOTYPE: SELECTIVE ANALYSIS OF TRACE-LEVEL TCE VAPORS IN CONTAMINATED HOMES

S. K. Kim^{1,2}, H. Chang^{1,2}, J. G. Bryant^{1,2}, D. R. Burris⁴ and E. T. Zellers^{1,2,3*}

¹Center for Wireless Integrated MicroSystems (WIMS),

²Departments of Environmental Health Sciences and ³Chemistry, University of Michigan, Ann Arbor, Michigan, USA

⁴Integrated Science and Technology, Inc., 228 Harrison Avenue, Panama City, FL 32401

799

M4D.007

A PRESSURE PROGRAMMABLE GAS CHROMATO-GRAPHY MICROSYSTEM UTILIZING MOTIONLESS KNUDSEN PUMP, FIBER-INTEGRATED OPTICAL DETECTOR, AND SILICON MICROMACHINED SEPARATION COLUMN

Jing Liu, Naveen K. Gupta, Xudong Fan, Kensall D. Wise, and Yogesh B. Gianchandani

Engineering Research Center for Wireless Integrated Microsystems, University of Michigan, USA

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18:00 - 20:30

Evening Reception at Fourth Floor of CNCC

TUESDAY, JUNE 7, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

SESSION II(1) – CMOS-MEMS

Room 309A

Session Chairs: Sami Franssila *Helsinki University of Technology, Finland*

Man Wong *University of Science & Technology, Hong Kong*

T1A.001

Invited Speaker

MEMS TECHNOLOGY DEVELOPMENT AND MANUFACTURING IN A CMOS FOUNDRY

CM Liu, Bruce C.S. Chou, Robert Chin-Fu Tsai, Nick Y.M. Shen, Benior SF Chen, Emerson CW Cheng, Hsiao Chin Tuan, Alex Kalnitsky, Sean Cheng, Chung-Hsien Lin, Tien-Kan Chung, Kuei-Sung Chang, Yi-Shao Liu

Taiwan Semiconductor Manufacturing Company, Hsin-Chu, Taiwan

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T1A.002

A 400×400µm² 3-AXIS CMOS-MEMS ACCELEROMETER WITH VERTICALLY INTEGRATED FULLY-DIFFERENTIAL SENSING ELECTRODES

Ming-Han Tsai¹, Yu-Chia Liu¹, Chih-Ming Sun¹, Chuanwei Wang², Chun-Wen Cheng³, and Weileun Fang^{1,2*}

¹Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan

²Power Mechanical Engineering Department, National Tsing Hua University, Hsinchu, Taiwan

³Taiwan Semiconductor Manufacturing Company, Hsinchu, Taiwan

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T1A.003

INTEGRATION AND PACKAGING TECHNOLOGY OF MEMS-ON-CMOS TACTILE SENSOR FOR ROBOT APPLICATION USING MOLDED THICK BCB LAYER AND BACKSIDE-GROOVED ELECTRICAL CONNECTION

M. Makihata¹, S. Tanaka¹, M. Muroyama¹, S. Matsuzaki¹, H. Yamada², T. Nakayama² U. Yamaguchi², K. Mima², Y. Nonomura³, M. Fujiyoshi³ and M. Esashi¹

¹Tohoku University, JAPAN, ²Toyota Motor Corp., JAPAN and ³Toyota Central R&D Labs., Inc., JAPAN

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T1A.004

A DIFFERENTIAL DIFFERENCE AMPLIFIER WITH AUTOMATIC GAIN SELECTION AS READOUT INTERFACE FOR CMOS STRESS SENSORS IN ORTHODONTIC BRACKETS

M. Kuhl¹, P. Gieschke¹, O. Paul¹, Y. Manoli^{1,2}

¹University of Freiburg, Department of Microsystems Engineering (IMTEK), Freiburg, Germany

²HSG-IMIT, Villingen-Schwenningen, Germany

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T1A.005

A FRENKEL-POOLE MODEL OF DIELECTRIC CHARGING IN CMOS MEMS

K.L. Dorsey¹ and G.K. Fedder^{1,2,3}

¹*Department of Electrical and Computer Engineering, Carnegie Mellon University, Pittsburgh, PA, USA*

²*The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA*

³*Institute for Complex and Engineered Systems, Carnegie Mellon University, Pittsburgh, PA, USA*

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SESSION II(2) – RF-MEMS

Room 309B

Session Chairs: Harrie Tilmans *IMEC, Belgium*

Jun-Bo Yoon *Korea Advanced Institute of Science and Technology, Korea*

T1B.001

Invited Speaker

2x2 MIMO, MULTI-MODE, WIDEBAND TRANSCEIVER SYSTEM FOR WORLDWIDEM-WIMAX (IEEE 802.16E) / WLAN (IEEE 802.11N) APPLICATIONS

K. Chun^{1,*}, S. Kang¹, Y. Jang¹, Y. E. Kim², J. Lee³, I. S. Song², J. H. Yi⁴, B. H. Kim⁵, B. Lee⁶, and H. C. Kim⁷

¹*ISRC, Electrical Engineering and Computer Science, Seoul National University, Seoul, KOREA*

²*Samsung Electronics Co., LTD., Kyunggi-do, KOREA*

³*Future Communications IC Inc., Kyunggi-Do, KOREA*

⁴*Yujeong Systems Co., Seoul, KOREA*

⁵*Electronics Engineering, Catholic University of Daegu, Gyeongbuk, KOREA*

⁶*Mechatronics Engineering, Korea University of Technology and Education, Chungnam, KOREA*

⁷*Electrical Engineering, University of Ulsan, Ulsan, KOREA*

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T1B.002

RF MEMS SWITCHES INTEGRATED WITH SEALED SUSPENDED COPLANAR WAVEGUIDES FOR RECONFIGURABLE RF CIRCUITS

K. Kuwabara, K. Takagahara, H. Morimura and Y. Sato

NTT Microsystem Integration Laboratories, NTT Corporation, Kanagawa, JAPAN

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T1B.003

VOLTAGE PROGRAMMABLE DUAL-BAND BANDPASS/BANDSTOP FILTER RESPONSE IN A SINGLE MICRO-ELECTRO-MECHANICAL DEVICE

X. Zou^{1*}, J. Yan¹ and A. A. Seshia¹

Nanoscience Centre, Department of Engineering, University of Cambridge, Cambridge, United Kingdom

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T1B.004

NANO-ELECTROMECHANICAL STORAGE ELEMENT FOR A LOW POWER COMPLIMENTARY LOGIC ARCHITECTURE USING PZT RELAYS

Robert M. Proie Jr.^{1,2}, Ronald G. Polcawich², Jeffrey S. Pulskamp², Tony Ivanov², Mona Zaghloul¹

¹*The George Washington University, Washington, DC 20052, USA*

²*US Army Research Laboratory, Adelphi, MD 20783-1197, USA*

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T1B.005

SPONTANEOUS OSCILLATION DUE TO CHARGING EFFECT IN MEMS RF SWITCHES

Y.-C. Chen¹, T. Ishida², H. Toshiyoshi^{2,3}, R. Chen¹, and H. Fujita²

¹*PME, National Tsing Hua University, Hsinchu, Taiwan*

²*IIS, the University of Tokyo, Tokyo, Japan*

³*RCAST, the University of Tokyo, Tokyo, Japan*

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SESSION II(3) – WET Assembly

Room 311(A+B)

Session Chairs: Jong-Uk Bu *SenPlus, Korea*

Amit Lal *Cornell University, USA*

T1C.001

Invited Speaker

PROGRAMMABLE SELF-ASSEMBLY FOR MICROSYSTEM INTEGRATION

J. H. Hoo¹, K. S. Park¹, R. Baskaran^{1,2}, K. F. Böhringer¹

¹*Department of Electrical Engineering, University of Washington, Seattle, USA*

²*Components Research, Intel Corporation, USA*

T1C.002	<p>.....848</p> <p>LOW TEMPERATURE ENCAPSULATION OF NANOCHANNELS WITH WATER INSIDE C.Shen[*], V.R.S.S. Mokkaapati, F.Santagata, A. Bossche, P.M.Sarro <i>DIMES - ECTM, Delft University of Technology, Delft, the Netherlands</i></p> <p>.....854</p>
T1C.003	<p>ELECTRO-WETTING ENHANCED BONDING STRENGTH Rong Cheng, Kewei Jiang, Xinxin Li[*] <i>State Key Lab of Transducer Technology, and, Science and Technology on Microsystem Lab, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, CHINA</i></p> <p>.....858</p>
T1C.004	<p>POLYMERIC DROPLET DEPOSITION AND SELF-RELEASE FORMING MICRO PARTS ON HETEROGENEOUS SURFACES K.Z. Tu and C.T. Chen[*] <i>μ FOS Laboratory, Department of Mechanical Engineering National Kaohsiung University of Applied Sciences, Kaohsiung, TAIWAN, Republic of China</i></p> <p>.....862</p>
T1C.005	<p>ORIENTATION-SPECIFIC SELF-ASSEMBLY AT AIR-WATER INTERFACE USING MAGNETIC FIELD K.S. Park¹, R.Baskaran^{1,2}, K.F. Böhringer¹ ¹<i>Department of Electrical Engineering, University of Washington, Seattle, USA</i> ²<i>Components Research, Intel Corporation, USA</i></p> <p>.....866</p>
SESSION II(4) – Biomolecular Sensing	
Auditorium	
Session Chairs: Hiroaki Suzuki <i>Tsukuba University, Japan</i>	
Yitshak Zohar <i>University of Arizona, USA</i>	
T1D.001	<p><u>Invited Speaker</u> NANOBIODEVICE BASED SINGLE MOLECULE AND CELL SENSING FOR CANCER DIAGNOSIS AND IN VIVO IMAGING FOR STEM CELL THERAPY <u>Y. Baba</u>^{1,2} ¹<i>Department of Applied Chemistry, School of Engineering, Nagoya University FIRST Research Center for Innovative Nanobiodevice, Nagoya University Department of Advanced Medical Science, School of Medicine, Nagoya University, Nagoya, Japan</i> ²<i>Health Research Institute, National Institute of Advanced Industrial Science and Technology (AIST),Takamatsu, Japan</i></p> <p>.....870</p>
T1D.002	<p>NANOPORE DNA SENSORS IN CMOS WITH ON-CHIP LOW-NOISE PREAMPLIFIERS J. Rosenstein¹, V. Ray², M. Drndic², and K. L. Shepard¹ ¹<i>Department of Electrical Engineering, Columbia University, New York, New York, USA</i> ²<i>Department of Physics, University of Pennsylvania, Philadelphia, Pennsylvania, USA</i></p> <p>.....874</p>
T1D.003	<p>DNA MICROARRAYS IMMOBILIZED ON UNMODIFIED PLASTICS IN A MICROFLUIDIC BIOCHIP FOR RAPID TYPING OF AVIAN INFLUENZA VIRUS Y. Sun¹, I.R. Perch-Nielsen¹, M. Dufva¹, D. Sabourin¹, D.D. Bang², J. Høgberg², M. Bu¹ and A. Wolff¹ ¹<i>DTU Nanotech, Department of Micro- and Nanotechnology, Technical University of Denmark, Kgs. Lyngby, DENMARK</i> ²<i>DTU Vet, National Veterinary Institute, Technical University of Denmark, Aarhus, DENMARK</i></p> <p>.....878</p>
T1D.004	<p>ULTRA-SENSITIVE CARBON NANOTUBES FOR SINGLE-MOLECULE DETECTION OF DNA HYBRIDIZATION KINETICS USING CONDUCTANCE-BASED CORRELATION SPECTROSCOPY S. Sorgenfrei¹, C.-Y. Chiu², C. Nuckolls², K. Shepard¹ ¹<i>Department of Electrical Engineering, Columbia University, New York, New York, USA</i> ²<i>Department of Chemistry, Columbia University, New York, New York, USA</i></p> <p>.....882</p>

T1D.005

MOTOR PROTEIN MOTION ALONG MICROTUBULES FOR MOLECULAR DETECTION

M.C. Tarhan¹, R. Yokokawa², H. Qiu¹, S.L. Karsten³ and H. Fujita¹

¹*CIRMM, The University of Tokyo, Tokyo, JAPAN*

²*Kyoto University, Kyoto, JAPAN*

³*University of California Los Angeles, Los Angeles, CA, USA*

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10:00 - 10:30

Break and Exhibit Inspection

10:30 - 12:15

PARALLEL ORAL SESSIONS

SESSION III(1) – Physical Sensors I

Room 309A

Session Chairs: **Lionel Buchailot** *University of Lille, France*

Xinxin Li *Institute of Microsystem and Information Technology, CAS, China*

T2A.001

SINGLE CHIP FLOW SENSING SYSTEM WITH A DYNAMIC FLOW RANGE OF MORE THAN 4 DECADES

T.S.J. Lammerink¹, J.C. Lötters^{1,2}, R.J. Wiegerink¹, J. Groenesteijn^{1,2}, J. Haneveld^{1,2}

¹*MESA+ Institute for Nanotechnology, University of Twente, The Netherlands*

²*Bronkhorst High-Tech BV, Ruurlo, The Netherlands*

.....890

T2A.002

CAPACITIVE ABSOLUTE PRESSURE SENSOR WITH INDEPENDENT ELECTRODE AND MEMBRANE SIZES FOR IMPROVED FRACTIONAL CAPACITANCE CHANGE

Chia-Fang Chiang¹, Andrew B. Graham², Matthew W. Messana¹, J. Provine¹, Daniela T. Buchman¹, Gary J. O'Brien², and Thomas W. Kenny¹

¹*Stanford University, Stanford, CA, USA*

²*Robert Bosch LLC, Research and Technology Center, Palo Alto, CA, USA*

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T2A.003

BAROMETRIC PRESSURE CHANGE MEASUREMENT

N. Minh-Dung, H. Takahashi, K. Matsumoto and I. Shimoyama

The University of Tokyo, Japan

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T2A.004

SAW-PIRANI VACUUM SENSOR WITH A NEW FUNCTIONING MODE AND A FAST RESPONSE TIME

D. Mercier¹, G. Bordel¹, P. Brunet-Manquat¹, S. Verrun¹, O. Elmazria², F. Sarry², B. Belgacem³, J. Bounouar⁴

¹*CEA-LETI-MINATEC, 17 Rue des Martyrs 38054 Grenoble Cedex 9, France*

²*Institut Jean Lamour, UMR 7198 CNRS-Nancy University 54506, France*

³*SENSEOR, 18 Rue Alain Savary 25000 Besançon, France*

⁴*ADIXEN, Alcatel Vacuum Technology France, 740009 Annecy, France*

.....902

T2A.005

A HIGHLY SENSITIVE FLEXIBLE PRESSURE AND SHEAR SENSOR ARRAY FOR MEASUREMENT OF GROUND REACTIONS IN PEDESTRIAN NAVIGATION

R. Surapaneni, K. Park, M.A. Suster, D.J. Young and C. H. Mastrangelo

University of Utah, Salt Lake City, UT, USA

.....906

T2A.006

MINIATURE ULTRASOUND ACOUSTIC IMAGING DEVICES USING 2-D PMUTS ARRAY ON EPITAXIAL PZT/SrRuO₃/Pt/ γ -Al₂O₃/Si STRUCTURE

Daisuke Akai¹, Takahiro Yogi², Ikuo Kamja², Yasuyuki Numata², Katsuya Ozaki², Kazuaki Sawada²,

Nagaya Okada³, Kazuki Higuchi³, and Makoto Ishida^{1,2}

¹*Electronics-Inspired Interdisciplinary Research Institute (EIIRIS), Toyohashi University of Technology, JAPAN*

²*Department of Electrical and Electronic Information Engineering, Toyohashi University of Technology, JAPAN*

³*Honda Electronics Co. Ltd., Toyohashi, JAPAN*

.....910

T2A.007	<p>IN SITU WAFER-LEVEL POLARIZATION OF ELECTRET FILMS IN MEMS ACOUSTIC SENSOR ARRAYS M. Kranz¹, M.G. Allen², and T. Hudson³ ¹Stanley Associates, Huntsville, AL, USA ²Georgia Institute of Technology, Atlanta, GA, USA ³U.S. Army AMRDEC, Huntsville, AL, USA</p> <p>.....914</p>
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SESSION III(2) – Resonators & Oscillators Room 309B

Session Chairs: **Farrokh Ayazi** *Georgia Institute of Technology, USA*
Dave Horsley *University of California, USA*

T2B.001	<p>ONE-DIMENSIONAL LINEAR ACOUSTIC BANDGAP STRUCTURES FOR PERFORMANCE ENHANCEMENT OF ALN- ON-SILICON MICROMECHANICAL RESONATORS L. Sorenson, J.L. Fu, and F. Ayazi <i>Georgia Institute of Technology, Atlanta, Georgia, USA</i></p> <p>.....918</p>
T2B.002	<p>A 1.75 GHz PIEZOELECTRICALLY-TRANSDUCED SIC LATERAL OVERMODED BULK ACOUSTIC-WAVE RESONATOR Songbin Gong, Nai-Kuei Kuo, and Gianluca. Piazza <i>Penn Micro and Nano Systems Lab, University of Pennsylvania, Philadelphia, PA, USA</i></p> <p>.....922</p>
T2B.003	<p>HIGH PERFORMANCE BULK MODE GALLIUM NITRIDE RESONATORS AND FILTERS V.J.Gokhale¹, J.Roberts², and M.Rais-Zadeh¹ ¹University of Michigan, Ann Arbor, Michigan, USA ²Nitronex Corporation, Durham, North Carolina, USA</p> <p>.....926</p>
T2B.004	<p>ENGINEERING OF ACOUSTIC METAMATERIALS WITH APPLICATION TO MEMS BAW RESONATORS X. Rottenberg, R. Jansen, P. Verheyen, R. Van Hoof, A. Verbist and H.A.C. Tilmans <i>Imec v.z.w., Kapeldreef 75, B-3001 Leuven, Belgium</i></p> <p>.....930</p>
T2B.005	<p>HIGH-Q, LARGE-STOPBAND-REJECTION INTEGRATED CMOS-MEMS OXIDE RESONATORS WITH EMBEDDED METAL ELECTRODES Yu-Chia Liu¹, Ming-Han Tsai¹, Wen-Chien Chen², Sheng-Shian Li^{1,2}, and Weileun Fang^{1,2} ¹Inst. of NanoEngineering and MicroSystems and ²Dept. of Power Mechanical Engineering National Tsing Hua University, Hsinchu, Taiwan</p> <p>.....934</p>
T2B.006	<p>VERY HIGH FREQUENCY DOUBLE-ENDED TUNING FORK NANO-MECHANICAL FIN-FET RESONATOR S.T. Bartsch, D. Grogg, A. Lovera, D. Tsamados, and A.M. Ionescu <i>Ecole Polytechnique Fédérale de Lausanne – EPFL Nanoelectronic Devices Laboratory Lausanne, SWITZERLAND</i></p> <p>.....938</p>
T2B.007	<p>ENCAPSULATED MECHANICALLY COUPLED FULLY-DIFFERENTIAL BREATHE-MODE RING FILTERS WITH ULTRA-NARROW BANDWIDTH S. Wang, S. A. Chandorkar, A. B. Graham, M. W. Messana, J. Salvia, and T.W. Kenny <i>Stanford University, Stanford, California, USA</i></p> <p>.....942</p>

SESSION III(3) –Bioprobes & Biodevices Room 311(A+B)

Chairs: **Yu Sun** *University of Toronto, Canada*
Fan-Gang Tseng *National Tsing Hua University, Taiwan*

T2C.001	<p>HIGH-Q IN-PLANE RESONANCE-MODE CANTILEVER BIO/CHEMICAL SENSOR FOR REAL-TIME DETECTION IN LIQUIDS</p>
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Y.H. Tao, C.Z. Wei, H.T. Yu, P.C. Xu, T.G. Xu, B. Xiong, Xinxin Li*
State Key Lab of Transducer Technology, and, Science and Technology on Microsystem Lab,
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, CHINA
.....946

T2C.002

SEMIPERMEABLE PARYLENE MEMBRANE AS AN ARTIFICIAL BRUCH'S MEMBRANE
Bo Lu¹, Zhao Liu¹, Laura Liu^{2,3}, Danhong Zhu^{2,3}, David Hinton^{2,3}, Biju Thomas², Mark S.
Humayun^{2,3} and Yu-Chong Tai¹
¹California Institute of Technology, Pasadena, CA, USA
²Doheny Eye Institute, Los Angeles, CA, USA
³University of Southern California, Los Angeles, CA, USA
.....950

T2C.003

**LABEL-FREE REAL TIME IMAGING OF NEURAL COMMUNICATION USING ACETYLCHOLINE
IMAGE SENSOR**
Shoko TAKENAGA¹, Yui TAMAI¹, Kengo HIRAI¹, Kazuhiro TAKAHASHI^{1,2}, Takashi
SAKURAI^{2,3}, Susumu TERAOKAWA^{2,3}, Makoto ISHIDA^{1,2}, Koichi OKUMURA^{1,2} and Kazuaki
Sawada^{1,2}
¹Department of Electrical and Electronic Information Engineering, Toyohashi University of Technology,
Toyohashi, Japan
²JST CREST, Tokyo, Japan
³Hamamatsu University School of Medicine, Hamamatsu, Japan
.....954

T2C.004

**NEW CLASS OF CHRONIC RECORDING MULTICHANNEL NEURAL PROBES WITH POST-IMPLANT
SELF-DEPLOYED SATELLITE RECORDING SITES**
Daniel Egert and Khalil Najafi
Center for Wireless Integrated Microsystems (WIMS)
University of Michigan, Ann Arbor, MI, USA
.....958

T2C.005

MULTILAYER PHASED MICROCOIL ARRAY FOR MAGNETIC RESONANCE IMAGING
O. G. Gruschke^{1,*}, L. Clad², N. Baxan³, K. Kratt², M. Mohammadzadeh³, D. von Elverfeldt³, A.
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T2C.006

**A FLEXIBLE FISH-BONE-SHAPED NEURAL PROBE STRENGTHENED BY BIODEGRADABLE SILK
COATING FOR ENHANCED BIOCOMPATIBILITY**
Fan Wu, Maesoon Im, and Euisik Yoon
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Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI, USA
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T2C.007

A MEMS DIFFERENTIAL AFFINITY SENSOR FOR CONTINUOUS GLUCOSE DETECTION
X. Huang¹, J. Oxsher², C. LeDuc³, Y. Ravussin³, Q. Wang², D. Accili⁴, R. Leibel³ and Q. Lin^{1*}
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NY, USA;
²Chemistry and Biochemistry Department, University of South Carolina, Columbia, SC, USA
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SESSION III(4) –Wafer Level Process

Auditorium

Session Chairs: Weileun Fang National Tsing Hua University, Taiwa

Jianmin Miao Nanyang Technological University, Singapore

T2D.001

**WAFER-LEVEL THIN FILM VACUUM PACKAGES FOR MEMS USING NANOPOROUS ANODIC
ALUMINA MEMBRANES**
J. Zekry^{1,2,*}, D.S. Tezcan¹, J.-P. Celis², R. Puers^{1,2}, C. Van Hoof^{1,2}, and H.A.C. Tilmans¹
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T2D.002

DIRECT WAFER BONDING OF ATOMIC LAYER DEPOSITED TiO₂ AND Al₂O₃ THIN FILMS

R. L. Puurunen¹, T. Suni^{1,2}, O. Ylivaara¹, H. Kondo³, M. Ammar⁴, T. Ishida², H. Fujita², A. Bosseboeuf⁴, S. Zaima³, H. Kattelus¹

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T2D.003

A WAFER-LEVEL POLY-SIGE-BASED THIN FILM PACKAGING TECHNOLOGY DEMONSTRATED ON A SOI-BASED HIGH-Q MEM RESONATOR

Ph. Helin*, A. Verbist, J. De Coster, B. Guo, S. Severi, A. Witvrouw, L. Haspelslagh and H.A.C. Tilmans

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WAFER LEVEL PACKAGING BASED ON AU-AU BONDING FOR A CMOS COMPATIBLE THERMAL WIND SENSOR

Ziqiang Dong, Ming Qin, Jingjing Chen, Yukun Qin, and Qing-An Huang*

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T2D.005

INVESTIGATIONS OF THERMO-COMPRESSION BONDING WITH THIN METAL LAYERS

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T2D.006

CONFORMAL COATING OF POLY(GLYCIDYL METHACRYLATE) AS A LITHO-GRAPHIC POLYMER BY INITIATED CHEMICAL VAPOR DEPOSITION

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T2D.007

HEATED MEMBRANES PREVENT CLOGGING OF APERTURES IN NANOSTENCIL LITHOGRAPHY

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¹Microsystems Laboratory, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

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T3P.001

IMPROVEMENT OF CMOS-MEMS ACCELEROMETER USING POST-CMOS SELECTIVE ELECTROPLATING TECHNIQUE

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MONOLITHIC PRESSURE+ACCELERATION SENSOR WITH SELF-TEST FUNCTION FOR RELIABLE & LOW-COST TIRE-PRESSURE-MONITORING-SYSTEM (TPMS) APPLICATIONS

C.Z. Wei^{1,2}, W. Zhou¹, Q. Wang¹, Xinxin Li^{1,2}

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T3P.003

AN SOI 3-AXIS ACCELEROMETER WITH A ZIGZAG-SHAPED Z-ELECTRODE FOR DIFFERENTIAL DETECTION

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³Tohoku University, Sendai, Miyagi, Japan

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T3P.004

PIEZOELECTRIC SWITCH TO ACTIVATE EVENT-DRIVEN WIRELESS SENSOR NODE BY SEVERAL HZ OF VIBRATION

T. Kobayashi^{1,3}, H. Okada^{1,3}, V. Z. Gang¹, R. Maeda¹, T. Masuda^{2,3}, and T. Itoh^{1,3}

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T3P.005

MEMS SENSOR WITH GIANT PIEZORESISTIVE EFFECT USING METALLSEMICONDUCTOR HYBRID STRUCTURE

H.-D. Ngo^{*1}, T. Tekin¹, T.-C. Vu¹, M. Fritz¹, W. Kurniawan¹, B. Mukhopadhyay¹, A. Kolitsch², M. Schiffer³, K.-D. Lang¹

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T3P.006

TRANSPARENT TOUCH PANEL WITH CONDUCTIVE LIQUID CHANNEL STRUCTURE

Koji Asano¹, Gakuto Kita¹, Mitsuhiro Shikida², and Kazuo Sato¹

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T3P.007

DESIGN AND IMPLEMENTATION OF A NOVEL CMOS MEMS CONDENSER MICROPHONE WITH CORRUGATED DIAPHRAGM

Chien-Hsin Huang^{1,2}, Ming-Han Tsai³, Chien-Hsing Lee⁴, Tsung-Min Hsieh⁴, Jhy-Cheng Liou⁴, Li-Che Chen², Ming-Chuen Yip¹, and Weileun Fang¹

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⁴Solid State System Corporation (3S), Hsinchu, Taiwan

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T3P.008

PRESSURE SENSOR USING NANO-OPTO-MECHANICAL SYSTEMS (NOMS)

X. Zhao^{1,2,3}, J. M. Tsai³, H. Cai³, X. M. Ji², J. Zhou², M. H. Bao², Y. P. Huang², D. L. Kwang³ and A. Q. Liu^{1*}

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T3P.009

A HIGH SENSITIVITY SOI ELECTRIC-FIELD SENSOR WITH NOVEL COMB-SHAPED MICROELECTRODES

Pengfei Yang^{1, 2}, Chunrong Peng¹, Haiyan Zhang^{1, 2}, Shiguo Liu¹, Dongming Fang¹, and Shanhong Xia^{1*}

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²Graduate School of the Chinese Academy of Sciences Beijing 100039, P.R.China

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Chemical Sensors and Microsystems

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 L.A. Beardslee¹, S. Truax¹, J.-J. Su¹, S.M. Heinrich², F. Josse³, O. Brand¹
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³*Department of Electrical and Computer Engineering, Marquette University, Milwaukee, WI, USA*
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 H. S. Wasisto^{1*}, S. Merzsch¹, A. Stranz¹, A. Waag¹, I. Kirsch², E. Uhde², T. Salthammer² and E. Peiner¹
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²*Fraunhofer - WKI, Material Analysis and Indoor Chemistry, Braunschweig, Germany*
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¹*Wuhan University, Wuhan, China*
²*Arizona State University, Tempe, USA*
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Dept. of Mechanical Engineering, UCSB, Santa Barbara, CA, USA
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 R. Tang¹, X. Qiu¹, J. Zhu¹, J. Oiler², H. Huang¹, H. Wang² and H. Yu^{1, 2, *}
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¹*Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan*
²*Department of Chemistry, National Tsing Hua University, Hsinchu, Taiwan*
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Institute of Acoustics, Chinese Academy of Sciences, Beijing, CHINA
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 M. Li¹, S. Biswas², M. H. Nantz², R. M. Higashi^{2,3,4} and X. A. Fu^{*1}
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T3P.038

FLEXIBLE POLYMER HUMIDITY SENSOR FABRICATED BY INKJET PRINTING

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T3P.039

A TEXTILE INTEGRATED SENSOR SYSTEM FOR MONITORING HUMIDITY AND TEMPERATURE

T. Kinkeldei, C. Zysset, K.H. Cherenack and G. Tröster

Swiss Federal Institute of Technology Zurich, Wearable Computing Lab, Zurich, Switzerland

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T3P.040

FEM MODELING SAW HUMIDITY SENSOR BASED ON ZNO/IDTS/ALN/SI STRUCTURES

D.T. Phan and G.S. Chung

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T3P.041

RAPID HORMONE IMMUNOSENSOR WITH FLUID CONTROL MECHANISM

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T3P.042

FLUORENE-THIOPHENE-BASED THIN-FILM FLUORESCENT CHEMOSENSOR FOR METHAMPHETAMINE VAPOR

Y.Y. Fu¹, L.Q. Shi¹, D. F. Zhu¹, C. He^{1,2}, D. Wen^{1,2}, C.M. Deng^{1,2}, Q.G. He¹, H. M. Cao¹, J. G. Cheng¹

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Bio-Sensors and Bio-Microsystems

T3P.043

LOCALIZED ELECTROPORATION OF MOUSE EMBRYO USING DIELECTRIC GUIDES

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T3P.044

RAPID ON-SITE MEASUREMENT OF THE FRESHNESS OF RICE ON A MICRO ELECTROCHEMICAL DEVICE

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T3P.045

AN ALL-DIGITAL, TIME-GATED 128X128 SPAD ARRAY FOR ON-CHIP, FILTER-LESS FLUORESCENCE DETECTION

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T3P.046

MAGNETIC MICROHEATERS FOR CELL SEPARATION, MANIPULATION, AND LYSING

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T3P.047

MULTI-SITE ELECTRORETINOGRAM RECORDINGS INSIDE ISOLATED MOUSE RETINA

USING FLEXIBLE SPATIALLY ARRANGED MICROELECTRODE PROBES

Wataru Tonomura¹, Shun Taga¹, Chieko Koike^{1,2} and Satoshi Konishi¹

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²PRESTO, JST, Kawaguchi, Saitama, JAPAN

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T3P.048

A MICRO DEVICE FOR IMPEDANCE AND MECHANICAL CHARACTERIZATION OF BIOLOGICAL CELLS

Jian Chen, Yi Zheng, Qingyuan Tan, Yan Liang Zhang, Jason Li, Steve To, and Yu Sun

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T3P.049

LOW COST AND HIGH SPECIFIC ANESTHETIC BIOSENSORS WITH FUNCTIONALLY IMPRINTED NANOCAVITIES ON POLYMER FILMS

Chien-Chong Hong¹, Chih-Chung Lin², Chian-Lang Hong², and Po-Hsiang Chang¹

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T3P.050

HIGH-DENSITY MICROELECTRODE ARRAY SYSTEM AND OPTIMAL FILTERING FOR CLOSED-LOOP EXPERIMENTS

David Jäckel, Jan Müller, Muhammad Usman Khalid, Urs Frey, Douglas Bakkum, Andreas Hierlemann

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T3P.051

EVALUATION OF THE PACKAGING AND ENCAPSULATION RELIABILITY IN FULLY INTEGRATED, FULLY WIRELESS 100 CHANNEL UTAH SLANT ELECTRODE ARRAY (USEA): IMPLICATIONS FOR LONG TERM FUNCTIONALITY

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Medical Microsystems

T3P.052

WIRELESS RECHARGING OF BATTERY OVER LARGE DISTANCE FOR IMPLANTABLE BLADDER PRESSURE CHRONIC MONITORING

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T3P.053

FLEXIBLE MICRO-TACTILE SENSOR FOR NORMAL AND SHEAR ELASTICITY MEASUREMENTS

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T3P.054

DEVELOPMENT OF A MICROFLUIDIC DEVICE WITH MICROCANTILEVER ARRAY FOR PROBING SINGLE CANCER CELL MECHANICS

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T3P.055

ANIMAL EXPERIMENTAL STUDY ON THE NERVE ROOT RETRACTION WITH A SILICON PRESSURE SENSOR

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T3P.056

INDIVIDUALLY-ADDRESSABLE PARYLENE MICRONEEDLE ARRAYS WITH INTEGRATED MICROCHANNELS FOR RETINAL PROSTHESIS STUDY

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T3P.057

PRELIMINARY THERMAL CHARACTERIZATION OF A FULLY-PASSIVE WIRELESS BACKSCATTERING NEURO-RECORDING MICROSYSTEM

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T3P.058

A FABRY-PÉROT PRESSURE SENSOR FABRICATED ON LEFT VENTRICULAR ASSIST DEVICE FOR HEART FAILURE IMPLANT

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Microfluidics

T3P.059

AN INTEGRATED MICROFLUIDIC SYSTEM FOR INTERSTITIAL FLUID TRANSDERMAL EXTRACTION

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T3P.060

ACOUSTIC TWEEZERS: ACHIEVING QUASI-DYNAMIC MICROPARTICLE PATTERNING USING TUNABLE SURFACE ACOUSTIC WAVES

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T3P.061

A MICROFLUIDIC CONTROL SYSTEM WITH RE-USABLE MICROPUMP/VALVE ACTUATOR AND INJECTION MOULDED DISPOSABLE POLYMER LAB-ON-A-SLIDE

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T3P.062

DIGITAL LIQUID-LIQUID MICROEXTRACTION

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DYNAMIC EFFECTS OF DROPLET IMPINGEMENT ON NANOTEXTURED SURFACE FOR HIGH EFFICIENT SPRAY COOLING

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A MICROFLUIDIC MIXER BASED ON PARALLEL, HIGH-SPEED CIRCULAR MOTION OF INDIVIDUAL MICROBEADS IN A ROTATING MAGNETIC FIELD

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ACTIVE SURFACE TENSION DRIVEN MICROPUMP USING DROPLET/MENISCUS PRESSURE GRADIENT

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OPTOELECTRONIC TWEEZERS INTEGRATION WITH MULTILAYER MICROFLUIDIC DEVICE USING SWNT EMBEDDED PDMS MEMBRANE ELECTRODE

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T3P.076

WIRELESSLY ACTUATED MICROVALVE SYSTEM USING INDUCTION HEATING AND ITS THERMAL EFFECT ON THE MICROFLUIDIC SYSTEM

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T3P.077

A BISTABLE SHAPE MEMORY MICROVALVE FOR THREE-WAY CONTROL

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T3P.078

HIGH-SPEED DELIVERY OF MICROBEADS IN MICROCHANNEL USING MAGNETICALLY DRIVEN MICROTOOL

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T3P.079

HIGH THROUGHPUT SEPARATION OF BLOOD CELLS BY USING HYDRODYNAMICS AND MAGNETOPHORESIS

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T3P.080

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Materials, Fabrication and Packaging Technologies

T3P.081

COMB-DRIVE III-NITRIDE MICRO MIRROR FABRICATED BY FAST ATOM BEAM ETCHING

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T3P.082

FABRICATION OF MICROPATTERNS ON CHANNEL SIDEWALLS USING STRAINRECOVERY PROPERTY OF A SHAPE-MEMORY POLYMER

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T3P.083

ROOM-TEMPERATURE REACTIVE BONDING BY USING NANO SCALE MULTILAYER SYSTEMS

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T3P.084

LASER ANNEALED SIGE DEVICES FOR MEMS APPLICATIONS AT TEMPERATURES BELOW 250°C

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T3P.085

PLASMA ENHANCED BONDING OF POLYDIMETHYLSILOXANE (PDMS) WITH PARYLENE

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T3P.086

SILICON RETAINER RING INTEGRATION IN MICRO-TURBINE WITH THRUST BALL BEARING SUPPORT MECHANISM

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T3P.087

TRANSFER TECHNOLOGY OF PYROLYZED POLYMER ONTO LOW THERMAL TOLERANCE SUBSTRATE

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T3P.088

NOVEL POST-PROCESS GAP REDUCTION TECHNOLOGY OF HIGH ASPECT RATIO MICROSTRUCTURES UTILIZING MICRO WELDING

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T3P.098

ELECTRODEPOSITION AND CHARACTERIZATION OF CONIMNP PERMANENT MAGNET ARRAYS FOR MEMS APPLICATIONS

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T3P.099

A POLYMER STACKING PROCESS WITH 3D ELECTRICAL ROUTINGS FOR FLEXIBLE TEMPERATURE SENSOR ARRAY AND ITS HETEROGENEOUS INTEGRATION

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T3P.100

THE SENSITIVITY OF STICTION PERFORMANCE TO SURFACE CHEMISTRY UNDER VARIOUS HUMIDITY REGIMES

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Theory, Design and Test Methodology

T3P.101

DESIGN OF PRECISION LIGHT INTENSITY MODULATION FOR LIGHT-ADDRESSABLE POTENTIOMETRIC SENSOR

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T3P.102

THIN FILM THERMAL CONDUCTIVITY METROLOGY USING PHOTOLUMINESCENCE OF QUANTUM DOTS

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T3P.103

A NOVEL STRESS ISOLATION GUARD RING DESIGN FOR THE IMPROVEMENT OF THREE-AXIS PIEZORESISTIVE ACCELEROMETER

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T3P.104

MODELING OF THE ELASTIC MODULUS OF CRYSTALLINE SILICON BASED ON A LATTICE DYNAMICS APPROACH

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T3P.105

ASSESSING POLYMER SORPTION KINETICS USING MICROMACHINED RESONATORS

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NONLINEAR AIR DRAG DAMPING OF TORSIONAL MICROSCANNERS

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T3P.107

MICROFLUIDIC FLOW METER AND VISCOMETER UTILIZING FLOW-INDUCED VIBRATION ON AN OPTIC FIBER CANTILEVER

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T3P.108

EFFECT OF LOADING RATES ON POLYMER MICROPILLAR BASED FORCE TRANSDUCERS

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T3P.109

DESIGN AND EXPERIMENTS OF A NANO-OPTO-MECHANICAL SWITCH USING EIT-LIKE EFFECTS OF COUPLED-RING RESONATOR

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T3P.110

A NOVEL, SIMPLE, AND Q-INDEPENDENT SELF OSCILLATION LOOP DESIGNED FOR VIBRATORY MEMS GYROSCOPES

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Actuators

T3P.111

WALKING OF A MAGNETICALLY BIPEDAL MICROROBOT

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T3P.112

CONTROL OF THE RADIAL MOTION OF A SELF-PROPELLED MICROBOAT THROUGH A SIDE RUDDER

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T3P.113

RAPID PROTOTYPING OF 3D MICROSTRUCTURES BY DIRECT PRINTING OF LIQUID METAL AT TEMPERATURES UP TO 500°C USING THE STARJET TECHNOLOGY

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T3P.114

CHARACTERIZATION OF THE 2ND GENERATION MAGNETIC MICROBEARING WITH INTEGRATED STABILIZATION FOR FRICTIONLESS DEVICES

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Session Chairs: **Klas Hjort** *Uppsala University, Sweden*

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A NOVEL TEST METHOD FOR SIMULTANEOUS MEASUREMENT OF THERMAL CONDUCTIVITY, CTE, RESIDUAL STRESS AND YOUNG'S MODULUS OF SUSPENDED THIN FILMS USING A LASER DOPPLER VIBROMETER

J. De Coster, M. Lofrano, R. Jansen, X. Rottenberg, S. Severi, J. Borremans, G. Van der Plas, S. Donnay, H.A.C. Tilmans and I. De Wolf¹

imec, Leuven, BELGIUM¹ also at Katholieke Universiteit Leuven, MTM, Leuven, BELGIUM

1701

SESSION IV(2) – Actuators

Room 309B

Session Chairs: **Chee Y. Kwok** *Univ. of New South Wales, Australia*

Isao Shimoyama *University of Tokyo, Japan*

T4B.001

A THREE-TERMINAL SINGLE-WALLED CARBON NANOTUBE THIN FILM MEMS SWITCH FOR DIGITAL LOGIC APPLICATIONS

Min-Woo Jang¹, Chia-Ling Chen¹, Walter E Partlo III², Shruti R Patil¹, Dongjin Lee³, Zhijang Ye³, David Lilja¹, T. Andrew Taton², Tianhong Cui³ and Stephen A. Campbell^{1*}

¹*Department of Electrical and Computer Engineering, University of Minnesota, Minneapolis, USA*

²*Department of Chemistry, University of Minnesota, Minneapolis, USA*

³*Department of Mechanical Engineering, University of Minnesota, Minneapolis, USA*

1705

T4B.002

NANO-OPTO-MECHANICAL LINEAR ACTUATOR UTILIZING GRADIENT OPTICAL FORCE

H. Cai¹, K. J. Xu², J. M. Tsai¹, G. Q. Lo¹, D. L. Kwong¹ and A. Q. Liu²

¹*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research) 11 Science Park Road, Singapore Science Park II, Singapore 117685*

²*School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 639798*

1709

T4B.003

NOVEL TWEEZERS USING ACOUSTICALLY OSCILLATING TWIN BUBBLES

K. H. Lee, J. H. Lee, J. M. Won, and S. K. Chung

Department of Mechanical Engineering, Myongji University, Yongin 449-728, South Korea

1713

T4B.004

HYGROSCOPIC BIOMIMETIC TRANSDUCERS MADE FROM CNT-HYDROGEL COMPOSITES

M. De Volder¹, S. Tawfick², D. Copic² and A.J. Hart²

¹*IMEC, Heverlee, Belgium and KULeuven, Leuven - Belgium*

²*The University of Michigan, Ann Arbor, MI – USA*

1717

T4B.005

A FUNCTIONAL MICROPROBE INTEGRATED WITH SHARP TIP AND HUGE DEFLECTION CRANK-SLIDER STRUCTURAL CANTILEVER FOR VERSATILE INSTRUMENT

X. Chen and D.W. Lee*

MEMS & Nanotechnology Laboratory, School of Mechanical Systems Engineering, Chonnam National University, Gwangju, Republic of Korea

1721

T4B.006

3D OMNIDIRECTIONAL CONTROLLABLE ELASTIC IPMC TWEEZER WITH SELF-SENSING AND ADJUSTABLE CLAMPING FORCE ABILITIES FOR BIOMEDICAL APPLICATIONS

Guo-Hua Feng* and Jen-Wei Tsai

Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan

1725

T4B.007

A MICRO ELECTRO-STATIC LINEAR ACCELERATOR BASED ON ELECTRO-MAGNETIC LEVITATION

I. Sari and M. Kraft

School of Electronics and Computer Science, University of Southampton, Southampton, UK

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SESSION IV(3) –Nanofabrication & Nanodevices Room 311(A+B)

Session Chairs: **Liwei Lin** *University of California at Berkeley, USA*

Osamu Tabata *Kyoto University, Japan*

- T4C.001** **BIONANO CRYSTALLIZED POLY-SI FILM FOR INCREASING TENSILE STRESS IN MEMS/NEMS DEVICE STRUCTURES**
S. Kumagai^{1,3*}, S. Miyachi¹, I. Yamashita^{2,3}, Y. Uraoka^{2,3}, and M. Sasaki^{1,3}
¹*Dept. of Advanced Science and Technology, Toyota Technological Institute, Nagoya, Japan*
²*Graduate School of Materials Science, Nara Institute of Science and Technology, Nara, Japan*
³*CREST, Japan Science and Technology, Saitama, Japan*
..... 1733
- T4C.002** **THREE DIMENSIONAL NANOSCALE FABRICATION AND MODELING OF DYNAMIC MODE MULTIDIRECTIONAL UV LITHO-GRAPHY**
Jungkwun ‘J.K.’ Kim^{1,2,3}, Xiaoyu Cheng², David E.Senior², Mark G. Allen³, and Yong-Kyu ‘YK’ Yoon^{1,2}
¹*State University of New York at Buffalo, Buffalo, NY, USA*
²*University of Florida, Gainesville, FL, USA*
³*Georgia Institute of Technology, Atlanta, GA, USA*
..... 1737
- T4C.003** **ELECTRICAL CATCHING AND TRANSFER OF NANOPARTICLES VIA NANOTIP SILICON PROBE ARRAYS**
A. Goryu¹, A. Ikeda¹, M. Ishida¹ and T. Kawano¹
¹*Toyohashi University of Technology, Toyohashi, Aichi, Japan*
..... 1741
- T4C.004** **BIOASSISTED SELECTIVE-CAPTURE AND RELEASE OF NANO-PARTICLES TOWARD APPLICATION ON MICROFLUIDIC DEVICES**
Y. Shimada^{1,*}, M. Suzuki², M. Sugiyama^{1,2}, I. Kumagai³ and M. Umetsu^{2,3}
¹*The University of Tokyo, Tokyo, Japan*
²*3D BEANS center, BEANS project, Tokyo, Japan*
³*Tohoku University, Sendai, Japan*
..... 1745
- T4C.005** **LAYER-BY-LAYER DEPOSITION OF COLLOIDAL SEMICONDUCTOR NANOCRYSTALS FOR INTEGRATION OF INFRARED PHOTON-DETECTORS ON 3D TOPOGRAPHY**
J. Wei¹, Y. Gao^{2,3}, A.J. Houtepen², G. Pandraud¹, P.M. Sarro¹
¹*DIMES/Delft University of Technology, Delft, Netherlands*
²*Chemical Engineering/Delft University of Technology, Delft, Netherlands*
³*Kavli Institute of Nanoscience/Delft University of Technology, Delft, Netherlands*
..... 1749
- T4C.006** **A NEMS OPTICAL SWITCH DRIVEN BY OPTICAL FORCE**
J. F. Tao^{1,2,3}, H. Cai³, A. B. Yu³, Q. X. Zhang³, J. Wu², K. Xu², J. T. Lin², G. Q. Lo³, D. L. Kwong³ and A. Q. Liu^{1*}
¹*School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798*
²*Beijing University of Posts and Telecommunications, Beijing 100876, China*
³*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), 11 Science Park Road, Singapore Science Park II, Singapore 117685*
..... 1753
- T4C.007** **GATE-ALL-ARROUND SINGLE-CRYSTAL LINE SILICON NANO-WIRE OPTICAL SENSOR**
B.M. Ziaei-Moayyed, B. Draper, and M. Okandan
Department of Advanced MEMS, Sandia National Laboratories, Albuquerque, NM, USA
..... 1757

SESSION IV(4) –Microfluidics I**Auditorium****Session Chairs:** **Christain Bergaud** *University of Toulouse, France***Yong-Kyu Yoon** *State University of New York at Buffalo, USA*

- T4D.001** CONTINUOUS FLOW LAYER-BY-LAYER MICROBEAD FUNCTIONALIZATION VIA A MICRO-POST ARRAY RAILING SYSTEM
Ryan D. Sochol, Ryan Ruelos, Valerie Chang, Megan E. Dueck, Luke P. Lee, and Liwei Lin
Berkeley Sensor and Actuator Center University of California, Berkeley, USA
..... 1761
- T4D.002** IN-SITU GENERATION AND SHRINKAGE OF MONODISPERSE WATER-IN-OIL EMULSION FOR FEMTOLITER COMPARTMENTALIZATION USING CAPILLARY TRAPS
Tianzhun Wu^{1,2}, Hiroaki Suzuki^{2,3}, and Tetsuya Yomo^{2,3,4}
¹*School of Physics and Engineering, Sun Yat-sen University, CHINA*
²*ERATO, JST, JAPAN*
³*Graduate School of Information Science and Technology, Osaka University, JAPAN*
⁴*Graduate School of Frontier Biosciences, Osaka University, JAPAN*
..... 1765
- T4D.003** AN ACTIVE GYROSCOPIC MAGNETIC MICROMIXER FOR RAPID FLUID MIXING IN DROPLET BASED MICROFLUIDIC SYSTEMS
Yi Zhang¹ and Tza-Huei Wang²
¹*Department of Biomedical Engineering, Sidney Kimmel Comprehensive Cancer Center, Johns Hopkins University, Baltimore, MD, USA*
²*Department of Mechanical Engineering, Department of Biomedical Engineering, Sidney Kimmel Comprehensive Cancer Center, Center of Cancer Nanotechnology Excellence at Johns Hopkins, Johns Hopkins University, Baltimore, MD, USA*
..... 1769
- T4D.004** HIGH-SPEED PULSED MIXING WITH HIGH-FREQUENCY SWITCHING OF MICROPUMP DRIVING AND ITS APPLICATION TO NANOPARTICLE SYNTHESIS
K. Sugano, H. Yoshimune, A. Nakata, Y. Hirai, T. Tsuchiya, and O. Tabata
Department of Micro Engineering, Kyoto University, Kyoto, Japan
..... 1773
- T4D.005** INERTIAL PARTICLE FOCUSING IN PARALLEL MICROFLUIDIC CHANNELS FOR HIGH-THROUGHPUT FILTRATION
J. Hansson¹, J.M. Karlsson², T. Haraldsson², W. van der Wijngaart², A. Russom¹
¹*Div. Cell Physics, Dept. Applied Physics, KTH Royal Institute of Technology, Stockholm, SWEDEN*
²*Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN*
..... 1777
- T4D.006** A WAFER-LEVEL, HETEROGENEOUSLY INTE-GRATED,HIGH FLOW SMA-SILICON GAS MICROVALVE
H. Gradin, S. Braun, G. Stemme and W. van der Wijngaart
Microsystem Technology Lab, KTH Royal Institute of Technology, Stockholm, SWEDEN
..... 1781
- T4D.007** A PASSIVE CHECK VALVE USING MICROSPHERES FOR LOW PRESSURE AND LOW FLOW RATE APPLICATIONS
K. Ou, M. Chiao
Department of Mechanical Engineering, The University of British Columbia, Vancouver, BC, CANADA
..... 1785

18:00 – 19:00**Transducers Women Party****Third Floor, CNCC****19:00****Adjourn for the Day**

WEDNESDAY, JUNE 8, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

SESSION V(1) –3D Integration

Room 309A

Session Chairs: **Weileun Fang** *National Tsing Hua University, Taiwan*
Qing-An Huang *Southeast University, China*

Invited Speaker

MICROBALL BEARING TECHNOLOGY FOR MEMS DEVICES AND INTEGRATED MICROSYSTEMS

R. Ghodssi¹, B. Hanrahan^{1,2}, and M. Beyaz¹

¹*MEMS Sensors and Actuators Laboratory (MSAL), Department of Electrical and Computer Engineering, Department of Materials Science and Engineering, Institute for Systems Research, University of Maryland, College Park, MD 20742, USA*

²*U. S. Army Research Laboratory, Adelphi, MD 20783, USA*

.....1789

W1A.001

W1A.002

A NOVEL MEMS CONFIGURATION FOR THREE DIMENSIONAL FINE POSITIONING AND MECHANICAL FIXING OF A BALLENS IN THE PACKAGING OF SILICON PHOTONICS

Q. X. Zhang¹, Y. Du^{1,2}, C.W. Tan¹, J. Zhang¹, M. B. Yu¹, G. Q. Lo¹, and D. L. Kwong¹

¹*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore*

²*Dept. of Mechanical Engineering, National University of Singapore*

.....1795

W1A.003

DIE-LEVEL TSV FABRICATION PLATFORM FOR CMOS-MEMS INTEGRATION

Y. Temiz, M. Zervas, C. Guiducci, and Y. Leblebici

École Polytechnique Fédérale de Lausanne, Lausanne, SWITZERLAND

.....1799

W1A.004

PLANAR MEMS RF CAPACITOR INTEGRATION

A. K. Stamper¹, C. V. Jahn², S. R. Dupuis¹, A. Gupta¹, Z.-X. He¹, R. T. Herrin¹, S. E. Luce¹, J. Maling¹, D. R. Miga¹, W. J. Murphy¹, E. J. White¹, S. J. Cunningham³, D. R. DeReus³, I. Vitomirov³, and A. S. Morris³

¹*IBM, Essex Junction, VT USA,*

²*IBM, Yorktown Heights, NY USA*

³*Wispry, Irvine, CA USA*

.....1803

SESSION V(2) –Optofluidics

Room 309B

Session Chairs: **Arum Han** *Texas A&M University, USA*

Ai-Qun Liu *Nanyang Technological University, Singapore*

W1B.001

Invited Speaker

OPTOFLUIDICS

Demetri Psaltis

EPFL - Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

.....1807

W1B.002

CORTICAL BLOOD FLOW IMAGING WITH A PORTABLE MEMS BASED 2-PHOTON FLUORESCENCE MICROENDOSCOPE

W. Piyawattanametha^{1,3}, O. Solgaard², and M. J. Schnitzer¹

¹*NECTEC, Pathumthani, Thailand 12120,* ²*Edward L. Ginzton Laboratory, Stanford University, Stanford, CA 94305,* ³*James H. Clark Center for Biomedical Engineering & Sciences, Stanford University, Stanford, CA 94305*

.....1809

W1B.003

PHOTOTHERMAL NANOBLADE FOR LARGE CARGO DELIVERY INTO MAMMALIAN CELLS

T.-H. Wu^{1,2}, T. Teslaa², S. Kalim², C.T. French³, S. Moghadam³, R. Wall³, J.F. Miller³, O.N. Witte³, M.A. Teitell², and P.-Y. Chiou¹

¹Department of Mechanical and Aerospace Engineering, University of California at Los Angeles (UCLA), Los Angeles, California, U SA

²Department of Pathology and Laboratory Medicine, UCLA, Los Angeles, California, USA

³Department of Microbiology, Immunology and Molecular Genetics, UCLA, Los Angeles, California, USA

.....1813

W1B.004

MULTISPECTRAL ANALYSIS OF CANCER CELLS USING QUANTUM DOT LEDS PATTERNED ON-CHIP

Ashwini Gopal, Zhiguo Wang, Kazunori Hoshino, Xiaojing Zhang

Department of Biomedical Engineering, The University of Texas at Austin, Austin, Texas, USA

.....1817

W1B.005

PORTABLE ORAL CANCER DETECTION USING MINIATURE CONFOCAL IMAGING PROBE WITH LARGE FIELD OF VIEW

Youmin Wang, Milan Raj, H. Stan McGuff, Ting Shen, Xiaojing Zhang

Department of Biomedical Engineering, University of Texas at Austin, Austin, USA ; Department of Pathology, University of Texas Health Science Center San Antonio, Austin, USA; NanoLite Systems, Inc., Austin, TX, USA

.....1821

SESSION V(3) –Bioanalysis Tools

Room 311(A+B)

Chairs: **Gwo-Bin Lee** National Cheng Kung University, Taiwan

Shuichi Shoji Waseda University, Japan

W1C.001

Invited Speaker

EFFICIENT AND HIGH-THROUGHPUT ELECTRO-PORATION CHIPS

Zhihong Li¹, Zewen Wei¹, Xueming Li¹, Quan Du², and Zicai Liang²

¹National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, China

²Institute of Molecular Medicine, Peking University, China

.....1825

W1C.002

MULTI-SITE MONITORING OF CHOLINE AND GLUTAMATE USING BIOSENSOR MICROPROBE ARRAYS IN COMBINATION WITH CMOS CIRCUITRY

O. Frey¹, J. Rothe¹, M.K. Lewandowska¹, P.D. van der Wal², N.F. de Rooij², and A. Hierlemann¹

¹Bio Engineering Laboratory, D-BSSE, ETH Zurich, Basel, SWITZERLAND

²Sensors, Actuators and Microsystems Laboratory, IMT, EPF Lausanne, Neuchatel, SWITZERLAND

.....1829

W1C.003

A COMPACT HALL-EFFECT SENSOR ARRAY FOR THE DETECTION AND IMAGING OF SINGLE MAGNETIC BEADS IN BIOMEDICAL ASSAYS

K. Skucha, P. Liu, M. Megens, J. Kim and B. Boser

University of California at Berkeley, Berkeley, California, USA

.....1833

W1C.004

3D LOBULE-MIMETIC CHIP VIA POSITIVE DIELECTROPHORESIS FORCE WITH SINUSOIDAL SPACING POLY (ETHYLENE GLYCOL)-DIACRYLATE MICRO-WALLS

Yu-Shih Chen¹, Ling-Yi Ke², and Cheng-Hsien Liu^{1,2}

¹Institute of NanoEngineering and MicroSystems,

²Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C.

.....1837

W1C.005

RESIDUAL STRESS-FREE 100 MHZ PZT-BASED CONCAVE DIAPHRAGM RESONATOR FOR LABEL-FREE PROTEIN-LIGAND BIOSENSING WITH SELF-ENHANCING MECHANISM

Guo-Hua Feng and Zhi-Dain Lin

Department of Mechanical Engineering, National Chung Cheng University, Chiayi, Taiwan

.....1841

SESSION V(4) –Energy Harvesting **Auditorium**

Session Chairs: **Todd Christenson** *HT MicroAnalytical, Inc., USA*
Roland Zengerle *University of Freiburg, Germany*

W1D.001	<p><u>Invited Speaker</u> MICROSYSTEMS FOR ENERGY HARVESTING K. Najafi, T. Galchev, E.E. Aktakka, R.L. Peterson, and J. McCullagh <i>Center for Wireless Integrated Microsystems (WIMS), University of Michigan, Ann Arbor, Michigan 48109-2122, USA</i></p> <p>..... 1845</p>
W1D.002	<p>A MICRO TESLA TURBINE FOR POWER GENERATION FROM LOW PRESSURE HEADS AND EVAPORATION DRIVEN FLOWS Vedavalli G. Krishnan¹, Zohora Iqbal¹ and Michel M. Maharbiz¹ ¹<i>University of California Berkeley, CA., US</i></p> <p>..... 1851</p>
W1D.003	<p>DESIGN AND MICROFABRICATION OF INTEGRATED MAGNETIC MEMS ENERGY HARVESTER FOR LOW FREQUENCY APPLICATION Quan Yuan¹, Student Member, IEEE, Xuming Sun¹, Student Member, IEEE, Dong-Ming Fang², Member, IEEE, Haixia Zhang¹, Senior Member, IEEE ¹<i>National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China.</i> ²<i>State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing 100190, China</i></p> <p>..... 1855</p>
W1D.004	<p>HIGHLY EFFICIENT PIEZOELECTRIC MICRO HARVESTER FOR LOW LEVEL OF ACCELERATION FABRICATED WITH A CMOS COMPATIBLE PROCESS M. Defosseux¹, M. Allain¹, P. Ivaldi², E. Defay² and S. Basrour¹ ¹<i>TIMA Laboratory (CNRS-Grenoble INP-UJF), Grenoble, France</i> ²<i>CEA LETI Minatec Campus, Grenoble, France</i></p> <p>..... 1859</p>
W1D.005	<p>A MILLIMETER-SIZED ELECTRET-ENERGY-HARVESTER WITH MICROFABRICATED HORIZONTAL ARRAYS AND VERTICAL PROTRUSIONS FOR POWER GENERATION ENHANCEMENT K. Ono, N. Sato, T. Shimamura, M. Ugajin, T. Sakata, S. Mutoh, and Y. Sato <i>NTT Microsystem Integration Laboratories, NTT Corporation, Atsugi, Kanagawa, Japan</i></p> <p>..... 1863</p>

10:00 - 10:30 Break and Exhibit Inspection

10:30 - 12:15 PARALLEL ORAL SESSIONS

SESSION VI(1) –Materials for Nanodevices **Room 309A**

Session Chairs: **Jin-Woo Choi** *Louisiana State University, USA*
Kukjin Chun *Seoul National University, Korea*

W2A.001	<p>STRUCTURAL AND THERMOELECTRIC CHARACTERIZATION OF INDIVIDUAL SINGLE CRYSTALLINE NANOWIRES Z. Wang¹, M. Kroener¹, and P. Woias¹ ¹<i>Laboratory for Design of Microsystems, Department of Microsystems Engineering – IMTEK, University of Freiburg, Germany</i></p> <p>..... 1867</p>
W2A.002	<p>IMPLEMENTATION OF INDUCTIVE PROXIMITY SENSOR USING NANOPOROUS ANODIC ALUMINUM OXIDE LAYER Pei-Hsuan Lo¹, Chitsung Hong¹, Sung-Cheng Lo², and Weileun Fang^{1,2} ¹<i>Institute of NanoEngineering and MicroSystems, ²Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan</i></p>

W2A.003	<p>NANOCRYSTALLINE SiC METAL-SEMICONDUCTOR-METAL PHOTODETECTOR WITH ZnO NANOROD ARRAYS FOR HIGH-TEMPERATURE APPLICATIONS</p> <p>Wei-Cheng Lien^{1,2,4}, Dung-Sheng Tsai⁴, Shu- Hsien Chiu⁴, Debbie G. Senesky^{2,3}, Roya Maboudian², Albert P. Pisano^{1,2,3}, Jr-Hau He⁴</p> <p>¹Applied Science and Technology Program, University of California, Berkeley, CA 94709, USA ²Berkeley Sensor and Actuator, University of California, Berkeley, CA 94709, USA ³Department of Mechanical Engineering, University of California, Berkeley, CA 94709, USA ⁴Institute of Photonics and Optoelectronics and Department of Electrical Engineering, National Taiwan University, Taipei 10617, Taiwan</p>	1871
W2A.004	<p>GRAPHITIZATION OF N-TYPE POLYCRYSTALLINE SILICON CARBIDE AND ITS APPLICATION FOR MICRO- SUPERCAPACITORS</p> <p>F. Liu^{1,a,*}, A. Gutes¹, C. Carraro¹, J. Chu² and R. Maboudian¹</p> <p>¹Berkeley Sensor & Actuator Center and Department of Chemical and Biomolecular Engineering University of California, Berkeley, CA 94720, USA ²Department of Precision Machinery and Precision Instrumentation, University of Science and Technology of China, Hefei, Anhui 230027, China</p>	1875
W2A.005	<p>A GRAPHENE-BASED MICROELECTRODE FOR RECORDING NEURAL SIGNALS</p> <p>C.H. Chen¹, C.T. Lin², J.J. Chen¹, W.L. Hsu¹, Y.C. Chang¹, S.R. Yeh¹, L.J. Li², and D.J. Yao^{1,*}</p> <p>¹National Tsing Hua University, Hsinchu, TAIWAN ²Academia Sinica, Taipei, TAIWAN</p>	1879
W2A.006	<p>REDUCING STICTION IN MICRO-ELECTROMECHANICAL SYSTEMS BY NANOMETER-SCALE FILMS GROWN BY ATOMIC LAYER DEPOSITION</p> <p>R.L. Puurunen¹, A. Hää rä¹, H. Ritala¹, J. Dekker¹, M. Kainlauri¹, H. Pohjonen¹, T. Suni¹, J. Kiihamäki¹, E. Santala², M. Leskelä², and H. Kattelus¹</p> <p>¹VTT Technical Research Centre of Finland, Espoo, FINLAND ²University of Helsinki, Laboratory of Inorganic Chemistry, Helsinki, FINLAND</p>	1883
W2A.007	<p>NANOELECTROMECHANICAL SWITCHES BASED ON DIAMOND-ON-DIAMOND</p> <p>M.Y. Liao, S. Hishita, and Y. Koide</p> <p>Sensor Materials Center, National Institute for Materials Science, Namiki 1-1, Tsukuba, Japan</p>	1887
W2A.007	<p>NANOELECTROMECHANICAL SWITCHES BASED ON DIAMOND-ON-DIAMOND</p> <p>M.Y. Liao, S. Hishita, and Y. Koide</p> <p>Sensor Materials Center, National Institute for Materials Science, Namiki 1-1, Tsukuba, Japan</p>	1891
SESSION VI(2) – Optics		Room 309B
Session Chairs: Takahito Ono <i>Tohoku University, Japan</i>		
Liang Dong <i>Iowa State University, USA</i>		
W2B.001	<p>“MEMSEYE” FOR OPTICAL 3D TRACKING AND IMAGING APPLICATIONS</p> <p>V. Milanović¹, A. Kasturi¹, N. Siu¹, M. Radojičić², and Y. Su²</p> <p>¹Mirrorcle Technologies, Inc., Berkeley, California, United States ²Adriatic Research Institute, Berkeley, California, United States</p>	1895
W2B.002	<p>HIGHLY EFFICIENT LED LENS BIOLOGICALLY INSPIRED FROM CUTICLE NANOSTRUCTURES OF FIREFLY LIGHT ORGANS</p> <p>J.J. Kim, Y.S. Lee, and K.H. Jeong</p> <p>Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea</p>	1899
W2B.003	<p>OPTIAL MEASUREMENT OF STRAIN USING SCATTERING FROM NANOPARTICLE PAIRS ON ELASTOMER</p> <p>T. Kan, K. Matsumoto, and I. Shimoyama</p> <p>The University of Tokyo, Tokyo, JAPAN</p>	

W2B.004	<p>.....1903</p> <p>MICROFABRICATION AND PACKAGING OF A RUBIDIUM VAPOR CELL AS A PLASMA LIGHT SOURCE FOR MEMS ATOMIC CLOCKS</p> <p>V. Venkatraman, Y. Petremand, C. Affolderbach, G. Mileti, N. de Rooij, H. Shea <i>LMTS, Ecole Polytechnique Federale de Lausanne, Switzerland; LTF, University of Neuchatel, Switzerland; SAMLAB, Ecole Polytechnique Federale de Lausanne, Switzerland</i></p> <p>.....1907</p>
W2B.005	<p>ON-CHIP OPTICAL POWER MEASUREMENT BY OPTICAL FORCE</p> <p>J. F. Tao^{1, 2, 3}, H. Cai³, A. B. Yu³, W. M. Zhu¹, Q. X. Zhang³, J. Wu², K. Xu², J. T. Lin², G. Q. Lo³, D. L. Kwong³ and A. Q. Liu¹</p> <p>¹<i>School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore 639798</i> ²<i>Beijing University of Posts and Telecommunications, Beijing 100876, China</i> ³<i>Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), 11 Science Park Road, Singapore Science Park II, Singapore 117685</i></p> <p>.....1911</p>
W2B.006	<p>SPR PHOTO DIODE DETECTOR USING TRANSPORTATION PHENOMENON OF PHOTON AND ELECTRON COUPLING</p> <p>Yoshiharu Ajiki¹, Tetsuo Kan², Kiyoshi Matsumoto², and Isao Shimoyama²</p> <p>¹<i>Future Creation Laboratory, Olympus Corporation, Tokyo, JAPAN</i> ²<i>Graduate School of Information Science and Technology, the University of Tokyo, Tokyo, JAPAN</i></p> <p>.....1915</p>
W2B.007	<p>DEVELOPMENT OF A “FLIP GLASS SUBSTRATE” LED PACKAGE TECHNOLOGY FOR COLOR BIN YIELD AND VIEW ANGLE ENHANCEMENT</p> <p>Chien-Lin Chang-Chien¹, Yu-Che Huang¹, Ming-Chuen Yip¹, and Weileun Fang^{1,2}</p> <p>¹<i>Power Mechanical Engineering, NEMS Inst., National Tsing Hua University, Hsinchu, Taiwan</i></p> <p>.....1919</p>

SESSION VI(3) –Biomedical Microdevices	Room 311(A+B)
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Session Chairs: Karl Böhringer <i>University of Washington, USA</i> Satoshi Konishi <i>Ritsumeikan University, Japan</i>
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W2C.001	<p>A MICROFLUIDIC BLOOD-CLOGGING VALVE FOR ON-CHIP BLOOD ANALYSIS</p> <p>W. Shi, L.W. Guo, and YC. Tai <i>California Institute of Technology, Pasadena, CA, USA</i></p> <p>.....1923</p>
W2C.002	<p>FULLY INTEGRAED DROPLET BASED POINT-OF-CARE PLATFORM FOR MOLECULAR DETECTION FROM CRUDE BIOSAMPLES</p> <p>Yi Zhang^{1,2}, Seungkyung Park³, Samuel Yang and Tza-Huei Wang^{1,2,4,5}</p> <p>¹<i>Department of Biomedical Engineering, ²Sidney Kimmel Comprehensive Cancer Center, ³Department of Emergency Medicine, ⁴Department of Mechanical Engineering, ⁵Center of Cancer Nanotechnology Excellence at Johns Hopkins, Johns Hopkins University</i></p> <p>.....1927</p>
W2C.003	<p>ISOLATION OF TUMOR CELLS USING A NEW MICROFLUIDIC INCUBATOR WITH MOVING-WALL STRUCTURES</p> <p>Ying-Hsin Chuang¹, Lien-Yu Hung², Keng-Fu Hsu³, Cheng-Yang Chou³ and Gwo-Bin Lee^{2*}</p> <p>¹<i>Department of Engineering Science, National Cheng Kung University, Tainan, Taiwan</i> ²<i>Department of Power Mechanical Engineering, National Tsing Hua University, Hsinchu, Taiwan</i> ³<i>Department of Obstetrics and Gynecology, National Cheng Kung University, Tainan, Taiwan</i></p> <p>.....1931</p>
W2C.004	<p>TOWARDS QUANTIFICATION OF BIO-COMPATIBILITY: MONITORING INGROWTH BEHAVIOR OF BIOMATERIALS IN TISSUE WITH A MICROSENSOR IMPLANT</p> <p>M. Kubon¹, M. Moschallski¹, T. Ensslen¹, G. Link¹, S. Werner¹, C. Burkhardt¹, H. Hartmann¹, B. Schlosshauer¹, G. Urban² and M. Stelzle¹</p> <p>¹<i>NMI Natural and Medical Institute at the University of Tuebingen, Reutlingen, Germany</i> ²<i>University of Freiburg, IMTEK, Laboratory of Sensors, Freiburg, Germany</i></p>

		1935
W2C.005	DISPOSABLE MICRO DEVICES FOR CLINICAL ICSI X.P. Zhang, Z. Lu, and Y. Sun <i>Department of Mechanical and Industrial Engineering, University of Toronto, Canada</i>	
		1938
W2C.006	A PARYLENE-BASED FLEXIBLE ELECTROPORATION CHIP APPLICABLE FOR IN VIVO GENE AND SIRNA DELIVERY Zewen Wei ^{1*} , Yuanyu Huang ^{2*} , Deyao Zhao ² , Zicai Liang ² , and Zhihong Li ¹ ¹ National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, China ² Institute of Molecular Medicine, Peking University, China	
		1942
W2C.007	MICRO-AQUATIC-FARM: ON CHIP STIMULATION AND EVALUATION SYSTEM FOR MICROORGANISMS BY MAGNETICALLY DRIVEN MICROTOOLS T. Kawahara ¹ , M. Sugita ¹ , M. Hagiwara ¹ , Y. Yamanishi ^{1,2} , F. Arai ^{1,3} , H. Kawano ⁴ , I. Shihira-Ishikawa ⁴ , and A. Miyawaki ⁴ ¹ Nagoya University, Japan ² JST PRESTO, Japan ³ Seoul National University, Korea ⁴ RIKEN Brain Science Institute, Japan	
		1946
SESSION VI(4) –Chemical Sensors II		Auditorium
Session Chairs: Ryszard Jachowicz <i>Warsaw University of Technology, Poland</i> Kazuaki Sawada <i>Toyohashi University of Technology, Japan</i>		
W2D.001	TEMPERATURE DEPENDENCE OF VACUUM ENCAPSULATED RESONATORS FOR HUMIDITY MEASUREMENT R.G. Hennessy, M. M. Shulaker, M. W. Messana, A.B Graham; N. Klejwa, J. Provine, T.W. Kenny, and R. T Howe <i>Stanford University, Stanford, CA, USA</i>	
		1950
W2D.002	ENHANCED PERFORMANCE OF A CMOS INTERDIGITAL CAPACITIVE HUMIDITY SENSOR BY GRAPHENE OXIDE Cheng-Long Zhao, Ming Qin, Wei-Hua Li, and Qing-An Huang* <i>Key Laboratory of MEMS of the Ministry of Education, Southeast University, Nanjing 210096, China</i>	
		1954
W2D.003	MEMS-BASED AC DIFFERENTIAL SCANNING CALORIMETRY B. Wang and Q. Lin <i>Department of Mechanical Engineering, Columbia University, New York, NY 10027, USA</i>	
		1958
W2D.004	ENHANCEMENT OF SENSITIVITY OF COULOMETRIC DETECTION USING A ONE-ELECTRODE SYSTEM K. Ikemoto, K. Kojima, F. Sassa, M. Yokokawa, and H. Suzuki <i>Graduate School of Pure and Applied Sciences, University of Tsukuba, Tsukuba, JAPAN</i>	
		1962
W2D.005	MULTIMODAL BIO-IMAGE SENSOR FOR REAL-TIME PROTON AND FLUORESCENCE IMAGING H. Nakazawa ^{1,2} , M. Ishida ^{1,3} , and K. Sawada ^{1,3,4} ¹ Integrated Circuit and Sensor System Group, Toyohashi University of Technology, Aichi 441-8580 Japan ² Research Fellow of the Japan Society for the Promotion of Science, Tokyo 102-8472 Japan ³ Electronics-Inspired Interdisciplinary Research Institute, TUT, Aichi 441-8580 Japan ⁴ Core Research Evolutional Science and Technology, JST, Tokyo 102-8666, Japan	
		1966

W2D.006

MICROFLUIDIC SURFACE-ENHANCED RAMAN SCATTERING SENSORS FOR ONLINE MONITORING TRACE CHEMICAL MIXING AND REACTION

H. Y. Mao, P.P. Lv and W.G. Wu*

National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China

.....1970

W2D.007

NANOPARTICLE SELF-ASSEMBLY BASED TRI-PETALOID ARRAYED STRUCTURES AS SURFACE-ENHANCED RAMAN SCATTERING SUBSTRATES

C. Qian, W.X. Yu, W.G. Wu*, Y.F. Wang, and H.Y. Mao

National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China

.....1974

12:15 - 13:15

Luncheon

13:15 - 16:15

W3P Poster Session III

Mechanical/Physical Sensors and Microsystems

W3P.001

LIGHTWEIGHT BIOCOMPATIBLE PHYSICAL FILM-BASED SENSORS: POLYMERS “SELF-METALLIZED” WITH ORGANIC MOLECULAR CONDUCTORS

Elena Laukhina,^{1,2*} Victor Lebedev,² Vladimir Laukhin,^{1,2,3} Gerard Oncins,⁴ Raphael Pfattner², Concepcio Rovira,^{1,2} Jaume Veciana^{1,2}

¹*CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Spain*

²*Institut de Ciència de Materials de Barcelona (ICMAB-CSIC), Campus UAB, Bellaterra, Spain*

³*Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain*

⁴*CCiTUB, Nanometric Techniques Unit, University of Barcelona, Spain*

.....1978

W3P.002

POSFET TOUCH SENSOR WITH ON-CHIP ELECTRONIC MODULE FOR SIGNAL CONDITIONING

A. Adami¹, R. S. Dahiya¹, C. Collini¹, D. Cattin², and L. Lorenzelli¹

¹*Bio-MEMS, Fondazione Bruno Kessler, Trento, ITALY*

²*University of Padova, Vicenza, ITALY*

.....1982

W3P.003

A NOVEL MEMS TUNABLE IONIZATION SENSOR BASED ON PATTERNED FREESTANDING NICKEL NANOWIRES AND MOVING ELECTRODE

T. Walewyns and L. A. Francis

Electrical Engineering Department, Institute of Information and Communication Technologies, Electronics and Applied Mathematics, Université catholique de Louvain, Louvain-la-Neuve, Belgium

.....1986

W3P.004

CONTROL OF MEMS ON THE EDGE OF INSTABILITY

C.B.Burgner, W.S.Snyders, and K.L.Turner

University of California, Santa Barbara, California, USA

.....1990

W3P.005

HIGH TEMPERATURE COMPATIBLE ALUMINUM NITRIDE RESONATING STRAIN SENSOR

F.T. Goericke^{1,*}, M.W. Chan¹, G. Vigevani¹, I. Izyumiⁿ², B.E. Boser², and A.P. Pisano¹

¹*Department of Mechanical Engineering, University of California, Berkeley, USA*

²*Department of Electrical Engineering, University of California, Berkeley, USA*

.....1994

W3P.006

FABRICATION AND TESTING OF AN IONIC ELECTROSPRAY PROPULSION SYSTEM DEVICE WITH A POROUS NI TIP ARRAY

H.Q. Li, D.G. Courtney, P. Diaz Gomez Maqueo and P. Lozano

Massachusetts Institute of Technology, Cambridge, MA, USA

.....1998

W3P.007

ELECTRICAL COUPLING SUPPRESSING FOR A MICROGYROSCOPE USING ASCENDING FREQUENCY DRIVE WITH 2-DOF PID CONTROLLER

	J.Cui, Z.Y. Guo, Z.Yang, Y.L. Hao, G.Z. Yan <i>Institute of Microelectronics, Peking University, Beijing, China</i> <i>National Key Laboratory of Science and Technology on Micro/Nano Fabrication</i>	2002
W3P.008	ANALYSIS OF ACCELERATION SENSITIVITY IN MEMS TUNING FORK GYROSCOPE Thakur Praveen Singh, Koji Sugano, Toshiyuki Tsuchiya and Osamu Tabata <i>Department of Micro Engineering, Kyoto University, Kyoto, Japan</i>	2006
W3P.009	TRASENSITIVE MASS SENSOR USING THE OUT-OF-PHASE VIBRATION EIGENSTATE OF INTERCOUPLED DUAL-MICROCANTILEVERS J. Wang, B. Feng, C. Li, F.Q. Zhang, K. Ding and W.G. Wu <i>National Key Laboratory of Science and Technology on Micro/Nano Fabrication, Institute of Microelectronics, Peking University, Beijing 100871, P. R. China</i>	2010
W3P.010	WIRELESS PASSIVE SENSING APPLICATION USING A CAVITY LOADED EVANESCENT MODE HALF MODE SUBSTRATE INTEGRATED WAVEGUIDE RESONATOR D. E. Senior ^{1,2} , X. Cheng ¹ , P. Jao ¹ , C. Kim ¹ , J.K. Kim ¹ , and YK Yoon ¹ ¹ <i>Department of Electrical Engineering, University of Florida, Gainesville, USA</i> ² <i>Department of Electrical and Electronic Engineering, Universidad Tecnológica de Bolivar, Colombia</i>	2014
W3P.011	A MONOLITHICALLY INTEGRATED 3-AXIS THERMAL-CONVECTIVE ACCELEROMETER WITH A PNEUMATICALLY CURVED THERMOPILE-CANTILEVER FOR Z-AXIS SENSING Quan Wang ^{1,2} , Xinxin Li ¹ ¹ <i>State Key Lab of Transducer Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai 200050, CHINA</i> ² <i>School of Mechanical Engineering, Jiangsu University, Zhenjiang 212013, CHINA</i>	2018
W3P.012	DIFFERENTIAL PRESSURE DISTRIBUTION MEASUREMENT OF A FREE-FLYING BUTTERFLY WING H. Takahashi, K. Matsumoto and I. Shimoyama <i>The University of Tokyo, Tokyo, Japan</i>	2022
W3P.013	SILICON CARBIDE PRESSURE SENSOR FOR HIGH TEMPERATURE AND HIGH PRESSURE APPLICATIONS: INFLUENCE OF SUBSTRATE MATERIAL ON PERFORMANCE Sheng Jin ¹ , Srihari Rajgopal ² , Mehran Mehregany ² ¹ <i>Materials Science and Engineering</i> ² <i>Electrical Engineering and Computer Science, Case Western Reserve University, Cleveland, OH, USA</i>	2026
W3P.014	ACCELEROMETER USING MOSFET WITH MOVABLE GATE ELECTRODE: ELECTROPLATING THICK NICKEL PROOF MASS ON FLEXIBLE PARYLENE BEAM FOR ENHANCING SENSITIVITY S. Aoyagi ¹ , M. Suzuki ¹ , J. Kogure ¹ , T. Kong ¹ , R. Taguchi ¹ , T. Takahashi ¹ , S. Yokoyama ² , and H. Tokunaga ³ ¹ <i>Kansai University, Osaka, Japan</i> ² <i>Hiroshima University, Hiroshima, Japan</i> ³ <i>M. T. C. Corp., Kanagawa, Japan</i>	2030
W3P.015	FLEXIBLE FORCE SENSOR MEASURING CHANGE IN CAPACITANCE DUE TO DIELECTRIC OIL DISPLACEMENT OUT OF DOMED POLYMER INTO SURROUNDING HANNELS T. Takahashi ¹ , M. Suzuki ¹ , S. Iwamoto ¹ , and S. Aoyagi ¹ ¹ <i>Kansai University, Osaka, Japan</i>	2034
W3P.016	NON-DEGENERATE PARAMETRIC AMPLIFICATION AND FILTERING IN BIOMIMETIC	

	<p>HAIR FLOW SENSORS H. Droogendijk*, C. M. Bruinink, R. G. P. Sanders and G. J. M. Krijnen MESA⁺ Research Institute, University of Twente, THE NETHERLANDS</p>	2038
W3P.017	<p>FORCE SENSOR FOR POWER TRANSFER BETWEEN THE HUMAN BODY AND THE ENVIRONMENT R.A. Brookhuis¹, T.S.J. Lammerink¹, R.J. Wiegerink¹, M.J. de Boer¹ and M.C. Elwenspoek^{1,2} ¹Transducers Science and Technology Group, MESA+ Research Institute, University of Twente, P.O. Box 217, 7500 AE Enschede, the Netherlands ²Fellow, FRIAS, Albert-Ludwigs University, Albertstr. 19, 79104 Freiburg, Germany</p>	2042
W3P.018	<p>THIN FILM ENCAPSULATED SIGE ACCELEROMETER FOR MEMS ABOVE IC INTEGRATION L. Wen¹, B.Guo², L. Haspeslagh², S. Severi², A. Witvrouw², R. Puers¹ ¹ESAT-MICAS, K.U.Leuven, Kasteelpark Arenberg 10, Leuven B-3001, Belgium ²IMEC, Kapeldreef 75, Leuven B-3001, Belgium</p>	2046
W3P.019	<p>PHOTODIODE WITH MICRO TEXTURE FOR IMPROVING SENSITIVITY AT LARGE ANGLE OF INCIDENCE FOR PARTICLE SENSORS A. Isozaki^{1,2}, K. Kuwana^{1,2}, Y. Tomimatsu^{1,3} and T. Itoh^{1,4} ¹BEANS Laboratory, Tsukuba, Japan ²The University of Tokyo, Tokyo, Japan ³Seiko Instruments Inc., Chiba, Japan ⁴AIST, Tsukuba, Japan</p>	2050
W3P.020	<p>ARTIFICIAL HAIR CELL WITH EMBEDDED PIEZORESISTIVE FORCE SENSORS Ji-Eun Han¹, Dongil Kim² and Kwang-Seok Yun² ¹Samsung Electronics, Giheung, Korea ²Department of Electronic Engineering, Sogang University, Seoul, Korea</p>	2054
W3P.021	<p>THE SENSITIVITY ENHANCEMENT FOR THE RADIATION SENSOR BASED ON FILM BULK ACOUSTIC-WAVE RESONATOR J. Oiler¹, X. Qiu¹, J. Zhu¹, R. Tang¹, S.J. Chen², H. Huang¹, K. Holbert¹, H. Barnaby¹, and H. Yu¹ ¹Arizona State University, Tempe, Arizona, USA ²University of Southern California, Los Angeles, California, USA</p>	2058
W3P.022	<p>ALUMINUM NITRIDE PMUT BASED ON A FLEXURALLY-SUSPENDED MEMBRANE A. Guedes^{1*}, S. Shelton¹, R. Przybyla², I. Izyumin², B. Boser² and D.A. Horsley¹ ¹Berkeley Sensor & Actuator Center, University of California, Davis, CA, USA ²Berkeley Sensor & Actuator Center, University of California, Berkeley, CA, USA</p>	2062
W3P.023	<p>A NOVEL MICRO-G, EXTENDED RANGE, SOI-MEMS PIEZORESISTIVE TIME-ACCELEROMETER OPERATING IN TWO DISTINCT TIME-BASED TRANSDUCTION MODES V. Rajaraman¹, B.S. Hau¹, L.A. Rocha², R.A. Dias², K.A.A. Makinwa¹ and R. Dekker¹ ¹Dept. of Microelectronics, Fac. EEMCS, Delft University of Technology (TU Delft), The Netherlands ²ISN/IPC, School of Engineering, University of Minho, Guimarães, Portugal</p>	2066
W3P.024	<p>A MICROMECHANICAL ULTRASONIC DISTANCE SENSOR WITH >1 METER RANGE Richard Przybyla^{1*}, Anita Flynn¹, Vipul Jain¹, Stefon Shelton², André Guedes², Igor Izyumin¹, David Horsley², and Bernhard Boser¹ Berkeley Sensor and Actuator Center ¹University of California, Berkeley, CA, USA ²University of California, Davis, CA, USA</p>	

Chemical Sensors and Microsystems

- W3P.025** FLOW INSENSITIVE THERMAL CONDUCTIVITY DETECTOR FOR μ GAS CHROMATOGRAPHY
B.C. Kaanta¹, H. Chen², and X. Zhang¹
¹*Boston University, Boston, MA, USA*
²*Schlumberger Doll Research, Cambridge, MA, USA*
.....2074
- W3P.026** MICROFABRICATED ELECTROSPRAY IONIZATION CHIP WITH 60 TIPS FOR HIGH THROUGHPUT MASS SPECTROMETRIC ANALYSES
L. Sainiemi^{1,2*}, T. Nissilä^{2,3}, R. Kostainen², R. A. Ketola³ and S. Franssila¹
¹*Department of Materials Science and Engineering, Aalto University School of Science and Technology, Helsinki, Finland*
²*Division of Pharmaceutical Chemistry, University of Helsinki, Helsinki, Finland*
³*Centre for Drug Research, University of Helsinki, Helsinki, Finland*
.....2078
- W3P.027** A MEMS GAS CHROMATOGRAPH FOR RAPID DETERMINATIONS OF EXPLOSIVE MARKER COMPOUNDS
E. T. Zellers^{1,2,3} G. Serrano^{1,2} H. Chang^{1,2} and L.K. Amos^{1,3}
¹*Center for Wireless Integrated MicroSystems (WIMS),*
²*Departments of Environmental Health Sciences ,*
³*Chemistry, University of Michigan, Ann Arbor, Michigan, USA*
.....2082
- W3P.028** MINIATURISED GAS CHROMATOGRAPHIC SYSTEM WITH METAL OXIDE GAS SENSOR ARRAY FOR FAST DETECTION OF OFF-FLAVOURS
M.-L. Bauersfeld¹, M. Bücking², J. Bruckert², J. Wöllenstein¹
¹*Fraunhofer Institute for Physical Measurement Technique IPM, Freiburg, Germany*
²*Fraunhofer Institute for Molecular Biology and Applied Ecology IME, Schmallingenberg-Grafschaft, Germany*
.....2086
- W3P.029** LOW-LEAKAGE GAS SAMPLE-INJECTION SYSTEM FOR GAS CHROMATOGRAPHY IN HARSH ENVIRONMENTS
Kinda Nacheff^{1,2}, Frédéric Marty¹, Kamran Danaie², Bertrand Bourlon², Eric Donzier² and Tarik Bourouina¹
¹*ESIEE-Université Paris Est, Noisy-le-Grand, FRANCE*
²*Schlumberger MEMS, Elancourt, FRANCE*
.....2090
- W3P.030** DEVELOPMENT OF A NOVEL MICROPRECONCENTRATOR FOR MICRO GAS CHROMATOGRAPH
W.-C. Tian^{1*}, H.-J. Shheen², T. -H. Wu², C. -J. Lu³, W. -R. Chen³ and T.-Y. Wei²
¹*Department of Electrical Engineering, National Taiwan University, Taipei, Taiwan*
²*Institute of Applied Mechanics, National Taiwan University, Taipei, Taiwan*
³*Department of Chemistry, National Taiwan Normal University, Taipei, Taiwan*
.....2094
- W3P.031** ELECTROLYTIC CHARGE INVERSION AT PROGRAMMABLE CMOS SENSOR INTERFACES
Krishna Jayant, Mark R. Hartman, Joshua B. Phelps, Philip H. Gordon, Dan Luo, Lois Pollack and Edwin C. Kan
¹*Electrical and Computer Engineering,*
²*Applied and Engineering Physics, 3Biological Engineering, Cornell University, Ithaca, NY, USA 14850*
.....2098
- W3P.032** CYCLODEXTRIN-BASED MICRO NEUROTRANSMITTER SENSOR FOR SELECTIVE CATECHOLAMINE HORMONE DETECTION
Jung-Hoon Yang¹, Hyun Tae Kim¹, Jung Woo Park², and Hanseup Kim¹
¹*Electrical and Computer Engineering,*

²Mechanical Engineering, University of Utah, Salt Lake City, UT 84112-9206

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W3P.033

DUAL PHOTONIC ELECTROCHEMICAL LAB ON A CHIP FOR LACTATE DETECTION IN CONTINUOUS FLOW MODE

O. Ordeig¹, P. Ortiz¹, X. Muñoz-Berbel¹, S. Demming², S. Büttgenbach², C. Fernández-Sánchez¹ and A.Llobera¹

¹Instituto de Microelectronica de Barcelona (IMB-CNM, CSIC), Bellaterra, Spain

²Institut für Mikrotechnik, Braunschweig, Germany

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W3P.034

FLUORINATED-HFO₂ LAYER FOR EIS STRUCTURE SENSITIVE TO POTASSIUM IONS

Kuan-I Ho¹, Tseng-Fu Lu¹, Meng-Cin Su¹, Jer-Chyi Wang^{1,2}, Chia-Ming Yang³, Dorota G. Pijanswska⁴ and Chao-Sung Lai^{1,2,*}

¹Department of Electronic Engineering, Chang Gung University, Tao-Yuan, Taiwan

²Biosensor Group, Biomedical Engineering Center, Chang Gung University, Tao-Yuan, Taiwan

³Inotera Memories, Inc., Tao-Yuan, Taiwan

⁴Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Warsaw, Poland

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W3P.035

DESIGN OF WIRELESS SENSOR NODE BASED ON A NOVEL HYBRID CHEMICAL SENSOR FOR HEAVY METAL MONITORING

W. Cai, H.X. Zhao, D.Ha, H.S. Guo, W. Zhang, and P. Wang

Department of Biomedical Engineering, Zhejiang University, Hangzhou, Zhejiang, China

Biosensor National Special Laboratory, Key Laboratory of Biomedical Engineering of Ministry of Education

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W3P.036

FUNCTIONALIZATION OF NANOSCALED 2-NM-THICK ALD-HFO₂ LAYER BY RAPID THERMAL ANNEALING AND CF₄ PLASMA FOR LAPS NH₄⁺ DETECTION

Jung-Hsiang Yang¹, Tseng-Fu Lu¹, Jer-Chyi Wang^{1,2}, Dorota G. Pijanswska³, Chi-Hang Chin⁴, Cheng-En Lue¹, Chia-Ming Yang⁵, and Chao-Sung Lai^{1,2,*}

¹Department of Electronic Engineering, Chang Gung University, Taoyuan, Taiwan

²Biosensor Group, Biomedical Engineering Center, Chang Gung University, Taoyuan, Taiwan

³Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Warsaw, Poland

⁴Institute of NanoEngineering and MicroSystems, National Tsing Hua University, Hsinchu, Taiwan

⁵Inotera Memories, Inc., Taoyuan, Taiwan

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W3P.037

A PHOTOVOLTAGE-BASED INTEGRATED SENSOR FOR NEPHROTOXICITY EVALUATION UNDER DRUG STIMULATION

J. Wang, H. Yu, H. Cai, L.P. Du, Q.J. Liu, and P. Wang

Biosensor National Special Laboratory, Key Lab of Biomedical Engineering of Education Ministry,

Department of Biomedical Engineering, Zhejiang University, Hangzhou, 310027, P. R. China

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W3P.038

WAVELENGTH-INTERROGATED INFRARED SURFACE PLASMON RESONANCE SENSOR WITH HIGH REFRACTIVE-INDEX SENSITIVITY

Q. Liu, Z.-M. Qi*, Z. Zhang, and D.-F. Lu

State Key Laboratory of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing 100190, China

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W3P.039

MULTI-WELL STRUCTURE FOR CELL CULTURE ON THE CHEMICAL IMAGING SENSOR

K. Miyamoto¹, T. Wagner¹, M. J. Schöning^{2,3}, and T. Yoshinobu^{1,4}

¹Department of Electronic Engineering, Tohoku University, JAPAN

²Institute of Nano- and Biotechnologies, Aachen University of Applied Sciences, GERMANY

³Institute of Bio- and Nanosystems (IBN-2), Research Centre Jülich, GERMANY

⁴Department of Biomedical Engineering, Tohoku University, JAPAN

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W3P.040

FLEXIBLE ELECTROCHEMICAL IMAGING BY LIGHT-ADDRESSABLE POTENTIOMETRIC SENSOR WITH "ZOOM-IN" FUNCTIONALITY

T. Wagner¹, K. Miyamoto¹, C.F. Werner², M.J. Schöning² and T. Yoshinobu^{1,3}

¹Department of Electronic Engineering, Tohoku University, Sendai, MIYAGI, JAPAN

²Institute of Nano- and Biotechnology, Aachen University of Applied Sciences, Jülich, NRW, GERMANY

³Department of Biomedical Engineering, Tohoku University, Sendai, MIYAGI, JAPAN

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Bio-Sensors and Bio-Microsystems

W3P.041

STICTION-FREE POLY-SIGE RESONATORS FOR MONOLITHIC INTEGRATION OF BIOSENSORS WITH CMOS

S. Lenci¹, F. Pieri², L. Haspesslagh¹, J. De Coster¹, S. Decoutere¹, A. Maestre Caro^{1,3}, S. Armini¹ and A. Witvrouw¹

¹Imec, Leuven, Belgium

²University of Pisa, Pisa, Italy

³KULeuven, Leuven, Belgium

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W3P.042

FLUORESCENT HYDROGEL FIBERS FOR LONG-TERM IN VIVO GLUCOSE MONITORING

Y. J. Heo^{1,2}, H. Shibata^{2,3}, T. Okitsu^{2,4}, T. Kawanishi^{2,3}, and S. Takeuchi^{1,2}

¹Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

²Life BEANS Center, BEANS Project, Tokyo, Japan

³TERUMO Co. Headquarters, Kanagawa, Japan

⁴Kyoto University Hospital, Kyoto, Japan

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W3P.043

COMPARISON OF EXTRACELLULAR SIGNALS BETWEEN GOLD AND CARBON NANOTUBES BASED MICROELECTRODE ARRAYS

C.H. Chen, L.H. Chen, H.C. Su, S.C. Chuang, S.R. Yeh, T.R. Yew, Y.C. Chang and D.J. Yao
National Tsing Hua University, Hsinchu, TAIWAN

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W3P.044

A HIGH-THROUGHPUT FULLY-AUTOMATED MICROFLUIDIC LIVE CELL ARRAY FOR COMBINATION DRUG TREATMENT ANALYSIS OF COLORECTAL CANCER CELLS

H. Wang¹, J. Kim², A. Jayaraman^{2,3}, M. Cypert⁴, J. Hua⁴, M. Bittner⁴, and A. Han^{1,3*}

¹Department of Electrical and Computer Engineering, Texas A&M University, College Station, TX, USA

²Department of Chemical Engineering, Texas A&M University, College Station, TX, USA

³Department of Biomedical Engineering, Texas A&M University, College Station, TX, USA

⁴Translational Genomics Research Institute, Phoenix, AZ, USA

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W3P.045

MICROENGINEERED IRON AND IRON-OXIDE CONTRAST AGENT PARTICLES FOR TUNABLE MULTISPECTRAL MAGNETIC RESONANCE IMAGING

X. Wang¹, S.W. Anderson², and X. Zhang¹

¹Department of Mechanical Engineering, Boston University, Boston, MA, USA

²Department of Radiology, Boston Medical Center, Boston, MA, USA

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W3P.046

THE EFFECT OF SEQUENCE LENGTH ON DNA DECORATED CNT GAS SENSORS

Y. Liu¹, M. Chen², M. Mohebbi¹, M.L. Wang³, and M. R. Dokmeci¹

¹ECE, Northeastern University, Boston, MA, USA

²Point Loma Nazarene University, San Diego, CA, USA

³CEE, Northeastern University, Boston, MA, USA

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W3P.047

TEMPERATURE MODULATED EXCITATION AND PHASE SENSITIVE DETECTION TO SELECTIVELY IMAGE DNA SEQUENCES

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W4A.002	<p>3-D MICROCOILS AS A METAMATERIAL WITH ELECTRIC AND MAGNETIC RESPONSE K. Kratt¹, S. Waselikowski², V. Badilita^{1,*}, U. Wallrabe¹, M. Walther², J. G. Korvink^{1,3} ¹<i>Department of Microsystems Engineering (IMTEK)</i> ²<i>Freiburg Materials Research Center (FMF)</i> ³<i>Freiburg Institute for Advanced Studies (FRIAS) University of Freiburg, Germany</i></p>	2666
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W4A.004	<p>ALL-OPTICAL PROGRAMMABLE PHOTONIC INTEGRATED CIRCUIT: AN OPTICAL ANALOGY TO ELECTRONIC FPGA Depeng Mao, Peng Liu, and Liang Dong <i>Department of Electrical and Computer Engineering, Iowa State University, Ames, Iowa, USA</i></p>	2674
W4A.005	<p>ACOUSTIC SPEAKER BASED ON HIGH-EFFICIENCY BROADBAND NANO-PILLAR PHOTONIC CRYSTAL OPTO-THERMO-MECHANICAL MEMS EXCITATION Yuerui Lu[*], and Amit La¹ <i>SonicMEMS Laboratory, School of Electrical and Computer Engineering</i></p>	

Cornell University, Ithaca, NY

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W4A.006

REFLECTANCE-BASED TiO₂ PHOTONIC CRYSTAL SENSORS

Y. Huang, G. Pandraud and P.M. Sarro

DIMES, Delft University of Technology, Delft, the Netherlands

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SESSION VII(2) –Materials & Characterization

Room 309B

Session Chairs: Lina Sarro *Delft University of Technology, Netherlands*

Kazuo Sato *Nagoya University, Japan*

W4B.001

NiFe-AAO NANOCOMPOSITE FOR PERFORMANCE ENHANCEMENT OF ON-CHIP SPIRAL INDUCTORS

Tzu-Yuan Chao, H. F. Hsu, K. M. Chen, and Y. T. Cheng

Microsystems Integration Laboratory, Department of Electronics Engineering & Institute of Electronics,

National Chiao Tung University, Hsinchu, Taiwan

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W4B.002

SPUTTERED MOLYBDENUM AS CONDUCTIVE MATERIAL FOR HIGH-TEMPERATURE MICROHOTPLATES

L. Mele^{1*}, F. Santagata¹, E. Iervolino², M. Mihailovic¹, T. Rossi¹, A.T. Tran¹, H. Schellevis¹, J.F. Creemer¹, P.M. Sarro¹

¹*Delft University of Technology, DIMES, Feldmannweg 17, 2628CT, Delft, The Netherlands (NL)*

²*Sensor Integration, Distributieweg 28, 2645 EJ Delfgauw, The Netherlands*

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W4B.003

PIEZORESISTIVE BIOCOMPATIBLE MEMBRANES FOR FLEXIBLE PRESSURE SENSORS

Vladimir Laukhin,^{1,2,3} Victor Lebedev,² Elena Laukhina,^{2,3*} Concepció Rovira,^{2,3} Jaume Veciana^{2,3}

¹*Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain*

²*Institut de Ciència de Materials de Barcelona ICMAB-CSIC, Campus UAB, Bellaterra, Spain*

³*CIBER de Bioingeniería, Biomateriales y Nanomedicina (CIBER-BBN), Spain*

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W4B.004

CREEP OF PARYLENE-C FILM

Jeffrey Chun-Hui Lin¹, Peigang Deng², Gilbert Lam³, Bo Lu¹, Yi-Kuen Lee², Yu-Chong Tai¹

¹*California Institute of Technology, Pasadena, CA, USA*

²*Hong Kong University of Science and Technology, Hong Kong*

³*University of California, San Diego, CA, USA*

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W4B.005

ELECTROLYTIC HYDROGENATION TECHNIQUE: NEW APPROACH FOR THE MODIFICATION OF TI-FILM MECHANICAL PROPERTIES AND MEMS APPLICATIONS

Chao-Lin Cheng¹, Wang-Shen Su², Yu-Tsung Tuan², Ming-Hao Shih³, Tair-I Wu³ and Weileun Fang^{1,2,4}

¹*Power Mechanical Eng. Dept., 4NEMS Inst., National Tsing Hua Univ., Hsinchu, Taiwan*

²*National Nano Device Laboratories, Hsinchu, Taiwan*

³*Department of Materials Engineering, Tatung University, Taipei, Taiwan*

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W4B.006

NEGATIVE-PHOTORESIST MECHANICAL PROPERTY FOR NANO-FILTRATION MEMBRANE EMBEDDED IN MICROFLUIDICS

Y. Hirai¹, A. Uesugi¹, Y. Makino¹, H. Yagyu², K. Sugano¹, T. Tsuchiya¹, and O. Tabata¹

¹*Department of Micro Engineering, Kyoto University, Kyoto, JAPAN*

²*Mitsuboshi Belting Ltd., Kobe, JAPAN*

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W4B.007

OXYGEN PLASMA FUNCTIONALIZED PEDOT/PSS-SWCNTS THIN FILM DEPOSITED BY ELECTROPHORESIS FOR GAS SENSING

J.M. Jian¹, X.S. Guo^{1*}, Q. Cai², and L.W. Lin³

¹*Biosensors National Special Laboratory, Department of Biosystems Engineering, Zhejiang University, Hangzhou, Zhejiang, China*

²*Institute of Ecology and Environment, Yangtze Delta Region Institute of Tsinghua University, Jiaxing, Zhejiang, China*

SESSION VII(3) –Nanotubes & Nanowires Room 311(A+B)

Session Chairs: **Reza Ghodssi** *University of Maryland, USA*

Klas Hjort *Uppsala University, Sweden*

- W4C.001** “PICKUP AND PLACE” INTEGRATION METHOD OF BRIDGING CARBON NANOTUBES BY STAMPING TRANSFER
Yusuke Takei, Kiyoshi Matsumoto, and Isao Shimoyama,
The University of Tokyo, Japan
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- W4C.002** PROGRAMMABLE TRANSFORMATION OF VERTICALLY ALIGNED CARBON NANOTUBES INTO 3D MICRO-STRUCTURES
M. De Volder^{1,2}, S. Tawfick¹, S.J. Park¹, D. Copic¹, A.J. Hart¹
¹*University of Michigan, Ann Arbor, MI – USA*
²*IMEC KULeuven, Heverlee, Belgium*
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- W4C.003** DENSELY PACKED CARBON NANOTUBE FOREST ON SILICON SUBSTRATE FOR MEMS SUPER-CAPACITOR APPLICATIONS
Y. Jiang and L. Lin*
Mechanical Engineering Department, Berkeley Sensor and Actuator Center, University of California at Berkeley, USA
.....2722
- W4C.004** AUTONOMOUS PASSIVE LIGHT TRACKING UTILIZING SINGLE-WALL CARBON NANOTUBE ENHANCED OPTO-THERMO-MECHANICAL ELASTOMER ACTUATORS
Ye Liu¹, Chensha Li¹, Chi-Wei Lo², and Hongrui Jiang^{1,2}
¹*Electrical and Computer Engineering Department, University of Wisconsin - Madison, Madison, WI, USA*
²*Materials Science Program, University of Wisconsin – Madison, Madison, WI, USA*
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- W4C.005** SELF-ALIGNED DOUBLE-GATE SUSPENDED-BODY CARBON NANOTUBE FIELD-EFFECT TRANSISTORS FOR RF APPLICATIONS
Ji Cao, Adrian M. Ionescu
Nanoelectronic Devices Laboratory (Nanolab), Ecole Polytechnique Fédérale de Lausanne, Switzerland
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- W4C.006** ULTRASENSITIVE PRESSURE SENSOR BASED ON GATE- ALL-AROUND NANOWIRE FET
Pushpapraj Singh^{1,2}, Jianmin Miao^{1,2}, Woo-Tae Park², Dim-Lee Kwong²
¹*School of mechanical and Aerospace Engineering, Nanyang Technology University, Singapore*
²*Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore*
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- W4C.007** HIGHLY SENSITIVE BILAYER STRUCTURED GRAPHENE SENSOR
F.B. Rao, H. Almumen, L.X. Dong, and W. Li
Electrical & Computer Engineering, Michigan State University, East Lansing, MI 48824, USA
.....2738

SESSION VII(4) –Devices for Cells & Microorganisms Auditorium

Session Chairs: **Tony Jun Huang** *Pennsylvania State University, USA*

Yi-Kuen Lee *University of Science & Technology, Hong Kong*

- W4D.001** MAGNETOPHORETIC LABELFREE CELL SEPARATION USING PARAMAGNETIC SOLUTION
F. Shen, H. Hwang, Y.K. Hahn and J.-K. Park
Department of Bio and Brain Engineering, KAIST, Daejeon, REPUBLIC OF KOREA
.....2742
- W4D.002** AMPLIFICATION OF CHEMOTACTIC RESPONSES OF MOTILE BACTERIAL CELLS FOR CHARACTERIZING PREFERENTIAL CHEMOTAXIS TOWARD CARBON SOURCES
M. Kim¹, S.H. Kim¹, S.K. Lee¹ and T. Kim¹
¹*Ulsan National Institute of Science and Technology, Ulsan, Korea*

W4D.003	<p>.....2746</p> <p>A GLUCOSE-RESPONSIVE INSULIN DELIVERY MICRO DEVICE EMBEDDED WITH NANOHYDRO GEL PARTICLES AS “SMART VALVES” Jian Chen^{1*}, Claudia R. Gordijo^{2*}, Michael Chu², Xiao Yu Wu^{2**}, and Yu Sun^{1**} ¹<i>Advanced Micro and Nanosystems Lab, University of Toronto, Canada</i> ²<i>Department of Pharmaceutical Sciences, University of Toronto, Canada</i></p> <p>.....2750</p>
W4D.004	<p>SI NANO-PILLARS FOR MEASURING TRACTION FORCE EXERTED BY FILOPODIA Uijin Jung, Tetsuo Kan, Kenta Kuwana, Kiyoshi Matsumoto and Isao Shimoyama <i>The University of Tokyo, Tokyo, JAPAN</i></p> <p>.....2754</p>
W4D.005	<p>GOLD NANOPARTICLE-BASED REDOX SIGNAL ENHANCEMENT TOWARDS THE DETECTION OF SINGLE BACTERIUM Jen-Kuei Wu¹, Hwan-You Chang² and Fan-Gang Tseng^{1,3*} ¹<i>Department of Engineering and System Science, National Tsing Hua University, Taiwan (R.O.C.)</i> ²<i>Department of Life Science, National Tsing Hua University (R.O.C.)</i> ³<i>Division of Mechanics, Research Center for Applied Sciences, Taiwan (R.O.C.)</i></p> <p>.....2758</p>
W4D.006	<p>BIOFUEL CELLS WITH TREHALOSE LEADING TO AN INSECT-IMPLANTED POWER SOURCE K. Shoji, M. Suzuki, Y. Akiyama, T. Hoshino, N. Nakamura, H. Ohno and K. Morishima, <i>Tokyo University of Agriculture and Technology, Tokyo, JAPAN</i></p> <p>.....2762</p>
W4D.007	<p>SEPARATION OF CAENORHABDITIS ELEGANS BY ELECTROTAXIS IN A MICRODEVICE P. Rezaei¹, S. Salam², P. R. Selvaganapathy^{1,*} and B. P. Gupta² ¹<i>Department of Mechanical Engineering, McMaster University, Hamilton, ON, CANADA</i> ²<i>Department of Biology, McMaster University, Hamilton, ON, CANADA</i></p> <p>.....2766</p>

18:00

Adjourn for the Day

19:00 - 22:00

Banquet

Banquet Hall, Ground Floor, CNCC

THURSDAY, JUNE 9, 2011

08:30 - 10:00

PARALLEL ORAL SESSIONS

SESSION VIII(1) –Polymers in MEMS

Room 309A

Session Chairs: Jürgen Brugger *Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland*

Ulrike Wallrabe *University of Freiburg, Germany*

Th1A.001

Invited Speaker

ELASTOMERIC CAPACITIVE SENSORS

S.P. Lacour¹, D.P.J. Cotton

¹*Ecole Polytechnique Fédérale de Lausanne, Laboratory for Soft Bioelectronic Interfaces, Lausanne, Switzerland*

²*University of Cambridge, Nanoscience Centre, Cambridge, UK*

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Th1A.002

A DESIGN OF LONGITUDINALLY-DIVIDED BALLOON STRUCTURE IN PDMS PNEUMATIC BALLOON ACTUATOR BASED ON FEM SIMULATIONS

K. Morimoto, A. Utsumi and S. Konishi

Ritsumeikan University, Shiga, JAPAN

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Th1A.003

ONE STEP INTEGRATION OF GOLD COATED SENSORS WITH OSTE POLYMER CARTRIDGES BY

LOW TEMPERATURE DRY BONDING

N. Sandström, R. Z. Shafagh, C.F. Carlborg, T. Haraldsson, G. Stemme and W. van der Wijngaart

KTH Royal Institute of Technology, Microsystem Technology Lab, Stockholm, Sweden

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Th1A.004

SINGLE-STEP FABRICATION OF ORGANIC NANOFIBROUS MEMBRANE FOR PIEZOELECTRIC VIBRATION SENSOR

G.F. Zheng¹, X. Wang¹, W.W. Li^{1,2}, T.P. Lei¹, W. Tao¹, J. Du¹, Q.Y. Qiu¹, X.G. Chi¹, and D.H. Sun^{1*}

¹*Department of Mechanical and Electrical Engineering, Xiamen University, Xiamen, Fujian, China*

²*Department of Mechanical Engineering, Xiamen University of Technology, Xiamen, Fujian, China*

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Th1A.005

MECHANICAL REGULATION OF COLLECTIVE CELL BEHAVIOR VIA MICROTOPOGRAPHIC SUBSTRATES

Adrienne T. Higa^{1*}, Ryan D. Sochol¹, Kosuke Iwai¹, Song Li², and Liwei Lin¹

¹*Berkeley Sensor and Actuator Center, University of California, Berkeley, USA*

²*Department of Bioengineering, University of California, Berkeley, USA*

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SESSION VIII(2) –Wireless Systems & Components Room 309B

Session Chairs: Paddy French *Delft University of Technology, the Netherlands*

William P. Taylor *Allegro MicroSystems, Inc., USA*

Th1B.001

Invited Speaker

Th1B.002

BATTERY-FREE WIRELESS TOUCH DRIVEN TRANSMITTER WITH ON-CHIP ANTENNAS FOR WIRELESS SENSOR SYSTEMS

Makoto Niino¹, Tuan-Anh Nguyen¹, Wang-Hoon Lee^{1,2}, Kazuaki Sawada^{1,2}, Makoto Ishida^{1,2}

¹*Toyohashi University of Technology, Toyohashi, Japan*

²*JST-CREST Advance Integrated Sensing Technology, Tokyo, Japan*

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Th1B.003

NOVEL FREQUENCY AGILE ELECTROMAGNETIC DECOUPLING MEMS DEVICE

Yun-Ho Jang¹, Ignacio Llamas-Garro², Jung-Mu Kim³, and Yong-Kweon Kim¹

¹*Seoul National University, Seoul, KOREA*

²*Centre Tecnologic de Telecomunicacions de Catalunya, Barcelona, SPAIN*

³*Chonbuk National University, Jeonju, KOREA*

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Th1B.004

INDUCTIVELY COUPLED WIREBONDED MICROCOILS FOR WIRELESS ON-CHIP NMR

V. Badilita^{1*}, B. Fassbender², O. Gruschke³, K. Kratt¹, R. Meier³, D. Sakellariou², J.G. Korvink^{3,4} and U. Wallrabe¹

¹*Lab. for Microactuators, Dept. of Microsystems Engineering – IMTEK, University of Freiburg, Germany*

²*CEA Saclay, IRAMIS, SIS2M, F-91191, Gif-sur-Yvette, France*

³*Lab. for Simulation, Dept. of Microsystems Engineering – IMTEK, University of Freiburg, Germany*

⁴*Freiburg Institute for Advanced Studies – FRIAS, University of Freiburg, Germany*

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Th1B.005

ON-CHIP RF INDUCTORS WITH MAGNETIC NANO PARTICLES MEDIUM

C. Yang¹, K. Koh¹, X. Zhu², and L. Lin¹

¹*University of California, Berkeley, CA, USA*

²*Samsung Electronics, Dallas, TX, USA*

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SESSION VIII(3) –MEMS Gyroscopes Room 311A

Session Chairs: Yi-Long Hao *Peking University, China*

Robert Okojie *NASA Glenn Research Center, USA*

Th1C.001

Invited Speaker

MULTI-DOF INERTIAL MEMS: FROM GAMING TO DEAD RECKONING

	<u>Farrokh Ayazi</u> Georgia Institute of Technology, Atlanta, GA, USA Qualtré Inc., Marlborough, MA, USA	2805
Th1C.002	SUB-DEGREE-PER-HOUR SILICON MEMS RATE SENSOR WITH 1 MILLION Q-FACTOR I.P. Prikhodko, S.A. Zotov, A.A. Trusov, and A.M. Shkel Microsystems Laboratory, University of California, Irvine, CA, USA	2809
Th1C.003	SINGLE-CRYSTAL-SILICON VIBRATORY CYLINDRICAL RATE INTEGRATING GYROSCOPE (CING) J. Cho, J.A. Gregory, and K. Najafi Center for Wireless Integrated Microsystems (WIMS) University of Michigan, USA	2813
Th1C.004	EXPERIMENTAL EVALUATION OF ALTERNATIVE DRIVE-MODE CONTROL ELECTRONICS DEVELOPED FOR HIGH-PERFORMANCE MEMS GYROSCOPES E. Sahin ¹ , S. E. Alper ¹ , and T. Akin ^{1,2} ¹ Middle East Technical University, MEMS Research and Applications Center, Ankara, TURKEY ² Middle East Technical University, Department of Electrical and Electronics Eng., Ankara, TURKEY	2817
Th1C.005	A MODE-MATCHED 0.9 MHZ SINGLE PROOF-MASS DUAL-AXIS GYROSCOPE W.K. Sung, M. Dalal and F. Ayazi School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30308-0250, USA	2821

SESSION VIII(4) –Medical Devices & Systems	Room 311B
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Session Chairs: **Jeong-Bong Lee** *University of Texas, Dallas, USA*
Zhihong Li *Peking University, China*

Th1D.001	<u>Invited Speaker</u> RETINAL IMPLANTS TO RESTORE VISION IN BLIND PEOPLE <u>Wilfried Mokwa</u> <i>Institute of Materials in Electrical Engineering I, RWTH Aachen University, Aachen, Germany</i>	2825
Th1D.002	DELIVERY OF AN ANTI-CANCER DRUG FROM A MAGNETICALLY CONTROLLED MEMS DEVICE SHOW CYTOTOXICITY IN PC3 AND HUVEC CELLS F. N. Pirmoradi ¹ , J. Jackson ² , H. Burt ² , and M. Chiao ¹ ¹ Department of Mechanical Engineering, University of British Columbia, Vancouver, BC, Canada ² Faculty of Pharmaceutical Sciences, University of British Columbia, Vancouver, BC, Canada	2831
Th1D.003	CAPSULE MICROROBOT FOR TARGETTING IN MEDICAL DIAGNOSTIC TREATMENT H. KOGA, Y. SAKATA, S. HIROSE and S.KONISHI <i>Ritsumeikan University, Shiga, JAPAN</i>	2835
Th1D.004	ELECTROCHEMICALLY-BASED DOSE MEASUREMENT FOR CLOSED-LOOP DRUG DELIVERY APPLICATIONS Christian A. Gutierrez, Roya Sheybani and Ellis Meng <i>University of Southern California, Department of Biomedical Engineering, Los Angeles, CA, USA</i>	2839
Th1D.005	A MEDICAL TACTILE SENSOR FOR MEASURING TISSUE HARDNESS IN ROBOTIC SURGICAL TOOLS Shenshen Zhao, David Parks, and Chang Liu <i>MedX Lab, Northwestern University, Evanston, IL, 60208, USA</i>	

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10:00 - 10:30	Break and Exhibit Inspection	
10:30 - 12:15	PARALLEL ORAL SESSIONS	
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	Session Chairs: Jose-Luis Sanchez-Rojas <i>Universidad de Castilla-La Mancha, Spain</i> Svetlana Tatic-Lucic <i>Lehigh University, USA</i>	
Th2A.001	A MEMS MICRO-REED SWITCH DESIGNED FOR PORTABLE APPLICATIONS Min Tang ¹ , Yong Hean Lee ¹ , Rakesh Kumar ¹ , Ravi Shankar ² , Olivier Le Neel ² ¹ <i>Institute of Microelectronics, A*STAR (Agency for Science, Technology and Research), Singapore</i> ² <i>ST Microelectronics Asia Pacific Pte Ltd, Singapore</i>2847
Th2A.002	MICROMECHANICAL MAGNETOMETERS BASED ON CLAMPED-CLAMPED HIGH-Q NONLINEAR RESONATORS D. Antonio and D. López <i>Center for Nanoscale Materials, Argonne National Laboratory, Argonne, IL, USA</i>2851
Th2A.003	NOVEL COUPLING CONCEPT FOR FIVE-CONTACT VERTICAL HALL DEVICES T. Kaufmann, F. Purkl, P. Ruther and O. Paul <i>Department of Microsystems Engineering (IMTEK), University of Freiburg, Germany</i>2855
Th2A.004	LOCALIZED STRAIN SENSING USING HIGH SPATIAL RESOLUTION, HIGHLY-SENSITIVE MEMS RESONANT STRAIN GAUGES FOR FAILURE PREVENTION Matthew W. Chan, David R. Myers, Brian D. Sosnowchik, Liwei Lin, and Albert P. Pisano <i>University of California, Berkeley, Berkeley, CA, United States</i>2859
Th2A.005	DETECTION SYSTEM OF INCIDENT SLIPPAGE AND FRICTION COEFFICIENT BASED ON A FLEXIBLE TACTILE SENSOR WITH STRUCTURAL ELECTRODES C.H. Chuang*, Y.R. Liou and C.W. Chen <i>Department of Mechanical Engineering, Southern Taiwan University, Tainan, TAIWAN</i>2863
Th2A.006	IR THERMOCYCLER FOR CENTRIFUGAL MICROFLUIDIC PLATFORM WITH DIRECT ON-DISK WIRELESS TEMPERATURE MEASUREMENT SYSTEM J. Burger ¹ , André Gross ¹ , Daniel Mark ³ , Felix von Stetten ^{1,3} , Roland Zengerle ^{1,2,3} and Günter Roth ^{1,2,3} ¹ <i>Laboratory for MEMS Applications, Department of Microsystems Engineering - IMTEK, University of Freiburg, Georges-Koehler-Allee 106, D-79110 Freiburg, Germany</i> ² <i>Centre for Biological Signalling Studies – BIOSS, University of Freiburg, Germany</i> ³ <i>HSG-IMIT, Wilhelm-Schickard-Straße 10, D-78052 Villingen-Schwenningen, Germany</i>2867
Th2A.007	A CONTOUR-MODE FILM BULK ACOUSTIC RESONATOR FOR MONITORING BLOOD COAGULATION IN REAL-TIME W. Xu ^{1*} , J. Appel ² , and J. Chae ¹ ¹ <i>Arizona State University, Tempe, Arizona, USA</i> ² <i>Auburn University, Auburn, Alabama, USA</i>2871
	SESSION IX(2) –Harsh Environmental Reliability	Room 309B
	Session Chairs: Gary Fedder <i>Carnegie Mellon University, USA</i> Luc Fréchette <i>Universite de Sherbrooke, Canada</i>	
Th2B.001	IMPROVED RELIABILITY OF SIC PRESSURE SENSORS FOR LONG TERM HIGH TEMPERATURE APPLICATIONS	

R.S. Okojie¹, V. Nguyen², E. Savrun², and D. Lukco³
¹NASA Glenn Research Center, Cleveland, OH, USA
²Sienna Technologies, Inc. Woodingville, WA, USA
³ASRC Research Corp., NASA Glenn Research Center, Cleveland, OH, USA
.....2875

Th2B.002 **VERY HIGH TEMPERATURE (800°C) OHMIC CONTACT OF AU/NI₂SI ON N-TYPE POLYCRYSTALLINE SILICON CARBIDE AGED IN AIR**
R. Larger and L. G. Fréchet
Department of Mechanical Engineering, Université de Sherbrooke, Sherbrooke, CANADA
.....2879

Th2B.003 **IMPACT OF ENCAPSULATION MATERIALS ON THE PERFORMANCE OF SILICON-BASED SOLID STATE HIGH PRESSURE SENSORS WITH SURFACE TRENCHES**
M. Baumann, C. Sander, P. Ruther, and O. Paul
Department of Microsystems Engineering (IMTEK), University of Freiburg, Germany
.....2883

Th2B.004 **AN SOI THERMAL-DIFFUSIVITY-BASED TEMPERATURE SENSOR WITH ±0.6°C (3σ) UNTRIMMED INACCURACY FROM -70°C TO 170°C**
C.P.L. van Vroonhoven and K.A.A. Makinwa
Delft University of Technology, Delft, The Netherlands
.....2887

Th2B.005 **DESIGN EVALUATION OF SHOCK INDUCED FAILURE MECHANISMS OF MEMS BY CORRELATION OF NUMERICAL AND EXPERIMENTAL RESULTS**
M. Naumann¹, D. Lin², J. Mehner¹, A. McNeil² and T. F. Miller²
¹*Chemnitz University of Technology, Department of Microsystems and Precision Engineering, Chemnitz, Germany*
²*Freescale Semiconductor Inc., Tempe, Arizona, United States*
.....2891

Th2B.006 **EFM STUDY OF THE INFLUENCE OF HUMIDITY ON CHARGE INJECTION AND CHARGE RELAXATION IN SILICON NITRIDE USED IN ELECTROSTATICALLY ACTUATED MEMS**
A. Nowodzinski¹, T. Toussaint¹, A. Koszewski¹, F. Souchon¹
¹*CEA-Leti LCFM, Grenoble, France*
.....2895

Th2B.007 **TIME PREDICTIVE MODEL OF CHARGE ACCUMULATION IN BULK PECVD DIELECTRIC MATERIALS USED FOR ELECTRO-STATIC RF MEMS SWITCHES**
F. Souchon¹, A. Koszewski¹, C. Dieppedale¹ and T. Ouisse²
¹*CEA-LETI-MINATEC-CAMPUS, Grenoble, FRANCE*
²*Grenoble INP and LMGP-UMRCNRS5628, Grenoble, FRANCE*
.....2899

SESSION IX(3) –Displays, Scanners and Modulators Room 311A

Session Chairs: **Mu Chiao** *University of British Columbia, Canada*
Zewen Liu *Tsinghua University, China*

Th2C.001 **LENS SCANNING BASED MEMS CATHETER FOR FORWARD ENDOSCOPIC OPTICAL COHERENCE TOMOGRAPHY**
H. C. Park[†], C. Song[†], and K. H. Jeong^{*}
Department of Bio and Brain Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea
.....2904

Th2C.002 **FRONTSIDE-ONLY PROCESSING OF 2-D MEMS SCANNER FOR MINIATURE DUAL-AXIS CONFOCAL MICROENDOSCOPES**
J.W. Jeong*, S. Vaithilingam, and O. Solgaard
E. L. Ginzton Laboratory, Department of Electrical Engineering, Stanford University, Stanford, CA, USA
.....2908

Th2C.003	<p>DEVELOPMENT OF THE MICRO-MIRROR WITH LARGE SCANNING ANGLE USING FE-BASED METALLIC GLASS THIN FILM Jae-Wung Lee¹, Yu-Ching Lin¹, Neelam Kaushik¹, Parmanand Sharma², Akihisa Inoue², Masayoshi Esashi¹ and Thomas Gessner^{3,4} ¹<i>WPI Advanced Institute for Materials Research Tohoku University, Sendai, Tohoku, Japan</i> ²<i>Institute for Materials Research, Tohoku University, Sendai 980-8577, Japan</i> ³<i>Fraunhofer ENAS, Chemnitz 09126, Germany</i> ⁴<i>Chemnitz University of Technology, Chemnitz, Germany</i></p> <p>.....2912</p>
Th2C.004	<p>INTERFEROMETRIC MODULATORS USING MECHANICALLY COUPLED MIRROR ACTUATORS FOR COLOR REPRODUCTION W. Han and Y.-H. Cho <i>Digital Nanolocomotion Center, Department of Bio and Brain Engineering, KAIST, Korea</i></p> <p>.....2916</p>
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SESSION IX(4) –Microfluidics II	Room 311B
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Session Chairs: C.J. Kim *University of California, Los Angeles, USA*

Th2D.001	<p>HIGH PRESSURE EWOD DIGITAL MICROFLUIDICS W. C. Nelson¹, M. Yen¹, P. Y. Keng^{2,3}, R. M. van Dam^{2,3} and C.-J. Kim¹ ¹<i>Mechanical and Aerospace Engineering Department</i> ²<i>Department of Molecular and Medical Pharmacology</i> ³<i>Crump Institute for Molecular Imaging University of California, Los Angeles (UCLA), USA</i></p> <p>.....2932</p>
Th2D.002	<p>ENHANCED MICRO-DROPLET SPLITTING, CONCENTRATION, SENSING AND EJECTION BY INTEGRATING ELECTROWETTING-ON-DIELECTRICS AND SURFACE ACOUSTIC WAVE TECHNOLOGIES Y. Li¹, Y.Q. Fu^{2,3}, S.D. Brodie², M. Alghane² and A.J. Walton¹ ¹<i>Institute for Integrated Micro and Nano Systems, School of Engineering, Institute for Integrated Systems-Part of ERPem, University of Edinburgh, Edinburgh, EH9 3JF, UK</i> ²<i>Department of Mechanical Engineering, School of Engineering and Physical Sciences, Institute for Integrated Systems - Part of ERPem, Heriot-Watt University, Edinburgh, UK</i> ³<i>Thin Film Centre, Scottish Union of Physics Alliance (SUPA), University of West of Scotland, Paisley, PA1 2BE, Scotland</i></p> <p>.....2936</p>
Th2D.003	<p>ON-CHIP SYNTHESIS OF SILICA NANOPARTICLE ASSEMBLIES WITH CONTROLLED SHAPE AND SIZE J.B. Wacker, V.K. Parashar, and M.A.M. Gijs <i>Laboratory of Microsystems, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland</i></p> <p>.....2940</p>

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Th2D.006	<p>FULLY INTEGRATED DILUTION SERIES GENERATION ON A LABORATORY CENTRIFUGE O. Strohmeier^{1,*}, M. Rombach¹, D. Mark², R. Zengerle^{1,2,3}, G. Roth^{1,2,3} and F. von Stetten^{1,2} ¹<i>Laboratory for MEMS Applications, Department of Microsystems Engineering - IMTEK, University of Freiburg, Georges-Koehler-Allee 106, 79110 Freiburg, GERMANY</i> ²<i>HSG-IMIT, Wilhelm-Schickard-Straße 10, 78052 Villingen-Schwenningen, GERMANY</i> ³<i>Center for Biological Signalling Studies – BIOS, University of Freiburg, GERMANY</i></p> <p>.....2952</p>
Th2D.007	<p>LEUKOCYTE 5-PART DIFFERENTIAL COUNT USING A MICROFLUIDIC CYTOMETER W. Shi¹, L.W. Guo¹, H. Kasdan², A. Fridge², and YC. Tai¹ ¹<i>California Institute of Technology, Pasadena, CA, USA</i> ²<i>IRIS Diagnostics Division, IRIS International Inc., Chatsworth, CA, USA</i></p> <p>.....2956</p>

12:15 - 13:15

Conference Adjourns / Luncheon

13:30 - 17:00

Technical Tour



Hotel & Travel Information

Hotel Information

China National Convention Center

Address: No.7 Tianchen East Road, Chaoyang District, Beijing 100105, China

Tel: +86 10 6499 1899

China National Convention Center Grand Hotel

Address: Building 1, No. 8 Precincts, Beichen West Road, Chaoyang District, Beijing 100105, China

Tel: +86 10 8437 2008

Yayuncun Hotel

Address: No.8 North Star East Road, Chaoyang District, Beijing 102008, China

Tel: +86 10 6499 3636

Travel Information

(1) Local Tour (LT)

LT1 Great Wall-Arts Factory-Lunch-Ming Tombs

08:30-18:00 RMB450/per person

The Great Wall of China, also known in China as the Great Wall of 10,000, is an ancient Chinese fortification built from the end of the 14th century until the beginning of the 17th century. The first major wall was built during the reign of the First Emperor, the main emperor of the short-lived Qin dynasty. This wall was not constructed as a single endeavor, but rather was created by the joining of several regional walls built by the Warring States.

The Ming Tombs are a group of mausoleums of 13 Ming Emperors. The underground burial chamber of Ming Emperor Wanli is open to the public since excavation in 1956. The Great Wall was originally built in 221 BC. The section of Juyongguan we are going to visit was built in the 15th century during the Ming Dynasty and repaired recently.

LT2 Forbidden City - Lunch - Temple of Heaven

08:30-18:00 RMB400/per person

The magnificent Forbidden City is a vast complex of palaces and pavilions which were home to Emperors for more than 500 years. The Temple of Heaven is a masterpiece of Ming (15th century) architecture, where the Emperors performed annual sacrificial rituals for good harvest.

LT3 Lama Temple - Lunch - Summer Palace**08:30-17:00 RMB370/per person**

The Lama Temple is the center of learning for the Yellow Hat sect of Tibetan Lamas with considerable religious and political sway. Today there are some 70 Mongolian lamas tending the temple. The Summer Palace is called "Yiheyuan" (Garden of Nurtured Harmony) in Chinese. It is up to now the best preserved and the largest imperial gardens in China.

LT4 Hutong Tour- Lunch–Beihai Park-Silk Alley**08:30-17:00 RMB340/per person**

We strongly recommend the Hutong Tour. It is a tour on an old style tricycle around the old city residential areas. It is the place where you can experience the local culture, traditions and the everyday life. Beihai Park is an imperial garden to the northwest of the Forbidden City in Beijing. Initially built in the 10th century, it is amongst the largest of Chinese gardens, and contains numerous historically important structures, palaces and temples.

LT Arrangement

Code	Itinerary	Date
LT1	Great Wall-Arts Factory-Lunch-Ming Tombs	June 6-9, 2011
LT2	Forbidden City - Lunch - Temple of Heaven	June 7-8, 2011
LT3	Lama Temple - Lunch - Summer Palace	June 7-8, 2011
LT4	Hutong Tour- Lunch–Beihai Park-Silk Alley	June 7, June 9, 2011

(2) Evening Program (EP)**EP1 Peking Opera 18:00-22:00 June 7, 2011****RMB200/per person**

Beijing Opera has entertained Beijingers for over 200 years with its elaborate costumes, ear-splitting arias, dazzling martial arts and musical dialogues. They are usually based on folk tales, famous novels and fairy tales. The stage has side message board showing subtitles in both English and Chinese.

EP2 Acrobatic Show 18:00-22:00 June 7, 2011**RMB200/per person**

The Chinese Acrobatic Troupes have traveled to many countries and have amazed audiences everywhere. To watch the Chinese Acrobatic is an extraordinary experience.

The Secretariat will reserve the right to raise the prices or cancel any of the above tour routes, if attendees are fewer than 10 persons.



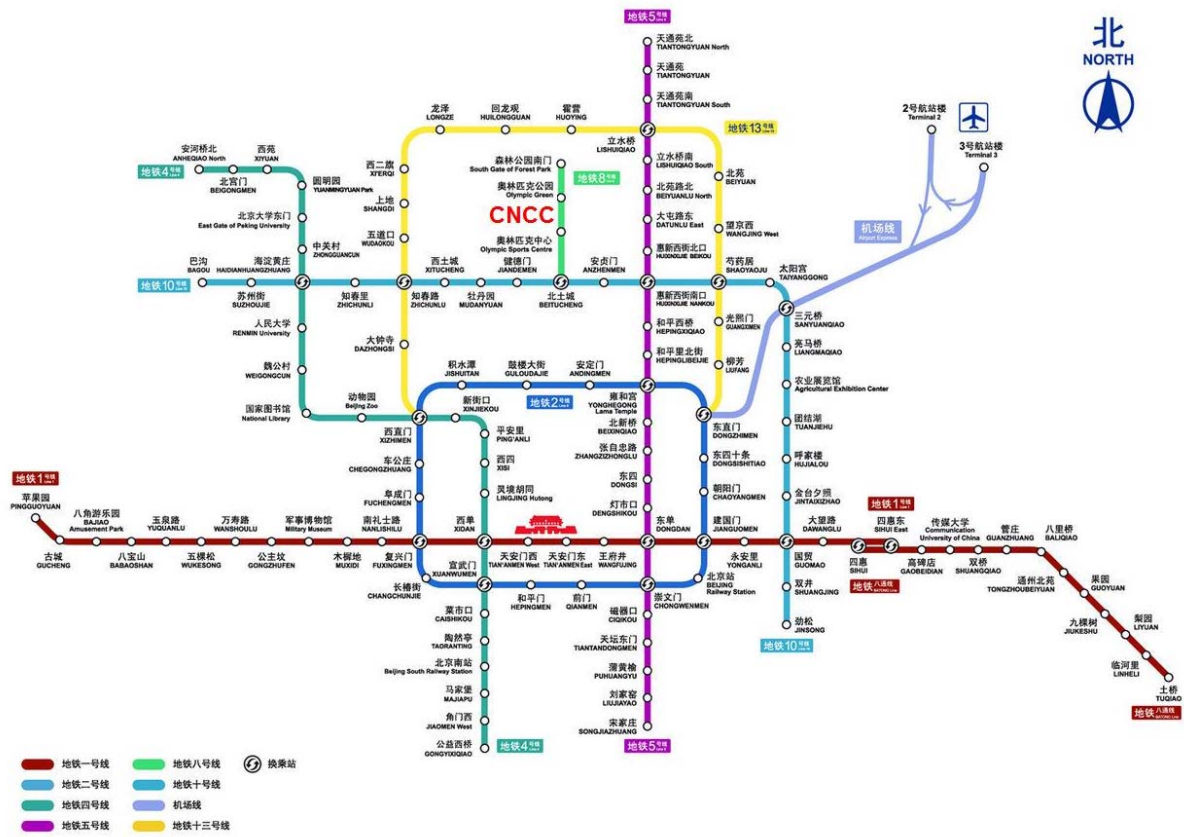
Schedule of Shuttle Bus

Date	Departure Location	Departure Time	Arrival Location	Notes
June 4	CNCC	14:30-17:30	Yayuncun Hotel	The bus leaves for the hotel every 30 minutes
June 5	CNCC	09:30-21:30	Yayuncun Hotel	The bus leaves for the hotel every 30 minutes
	Yayuncun Hotel		CNCC	
June 6	Yayuncun Hotel	07:30-08:10	CNCC	Opening Ceremony will be held at 08:30
	CNCC	20:20-21:00	Yayuncun Hotel	Reception will end at about 20:30
June 7	Yayuncun Hotel	07:30-08:10	CNCC	
	CNCC	18:00-18:30	Yayuncun Hotel	
June 8	Yayuncun Hotel	07:30-08:10	CNCC	Banquet will end at about 21:30
	CNCC	18:00-18:30	Yayuncun Hotel	
		21:30-22:00		
June 9	Yayuncun Hotel	07:30-08:10	CNCC	
	CNCC	12:30-13:20	Yayuncun Hotel	

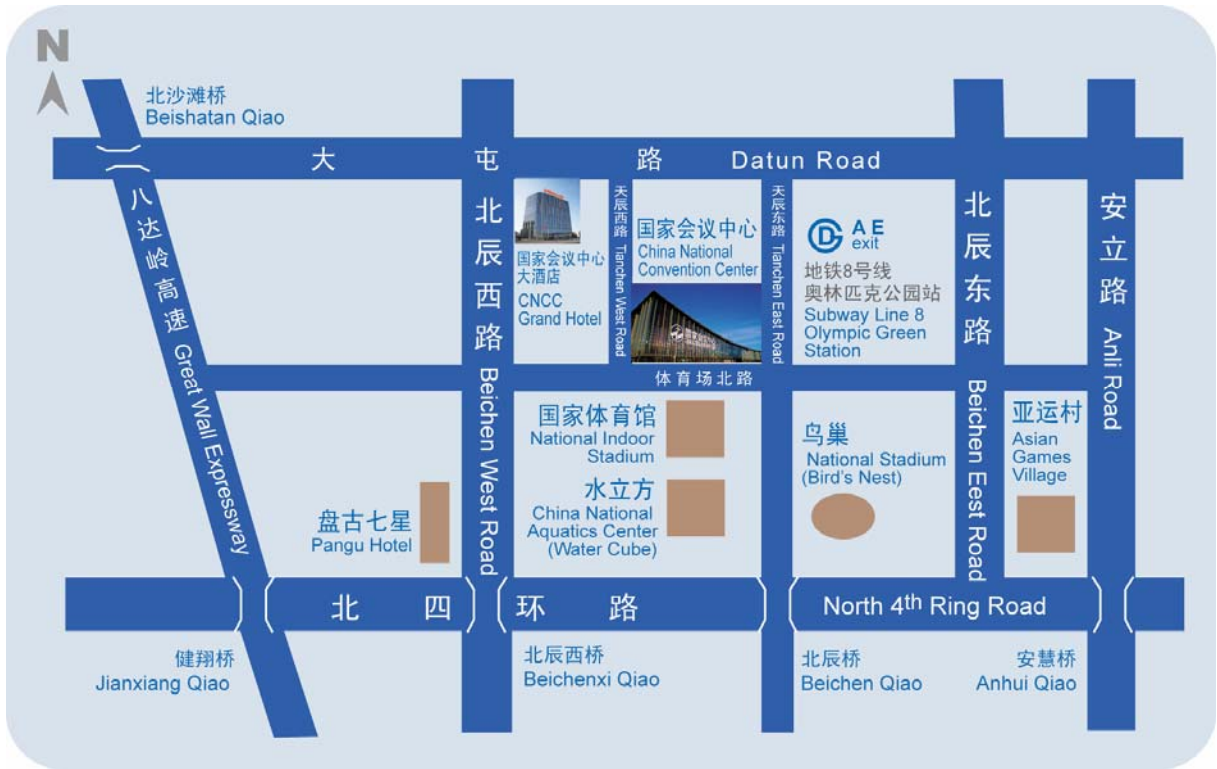


Floor Plans and Maps

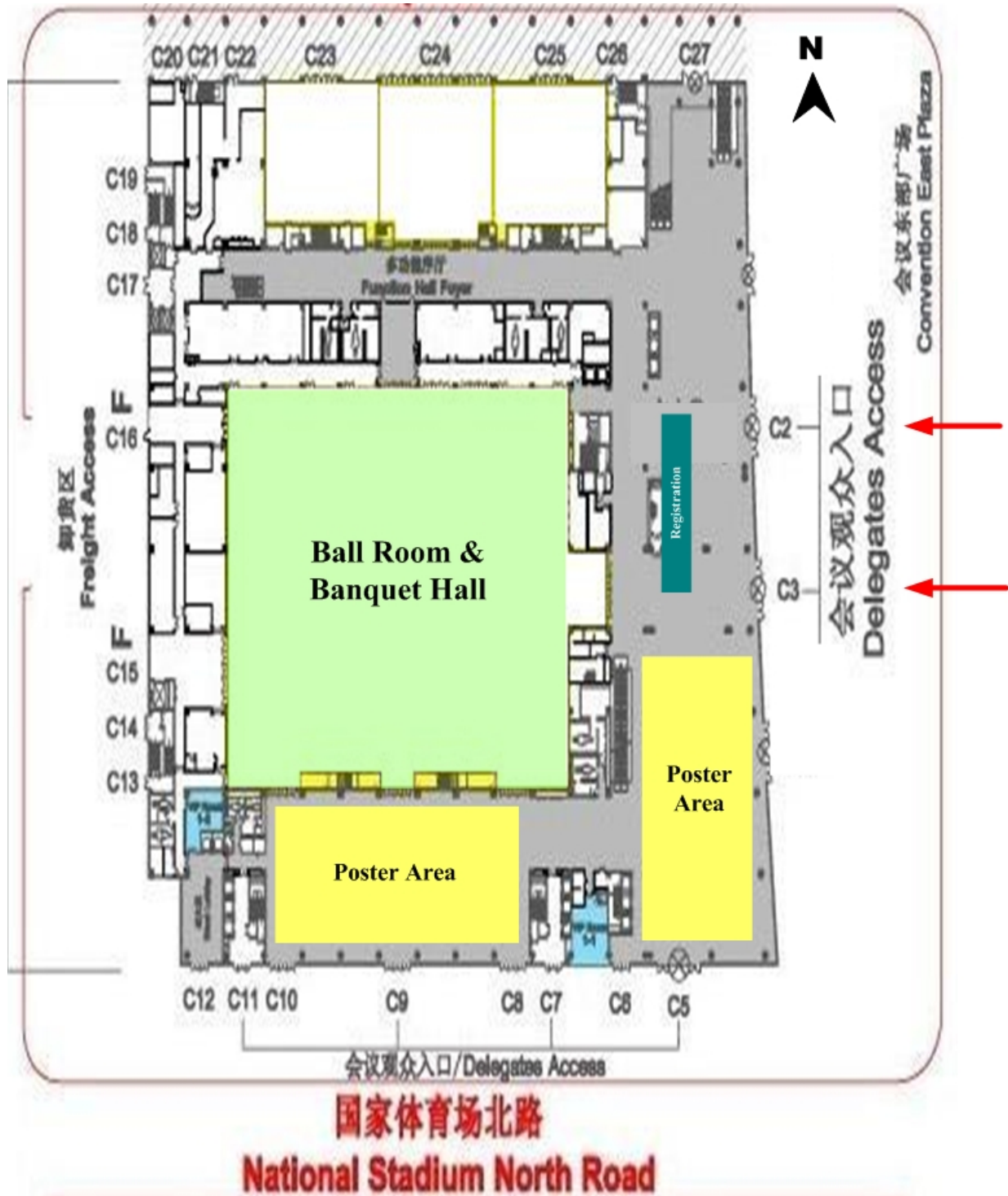
Route Map of Beijing Subway



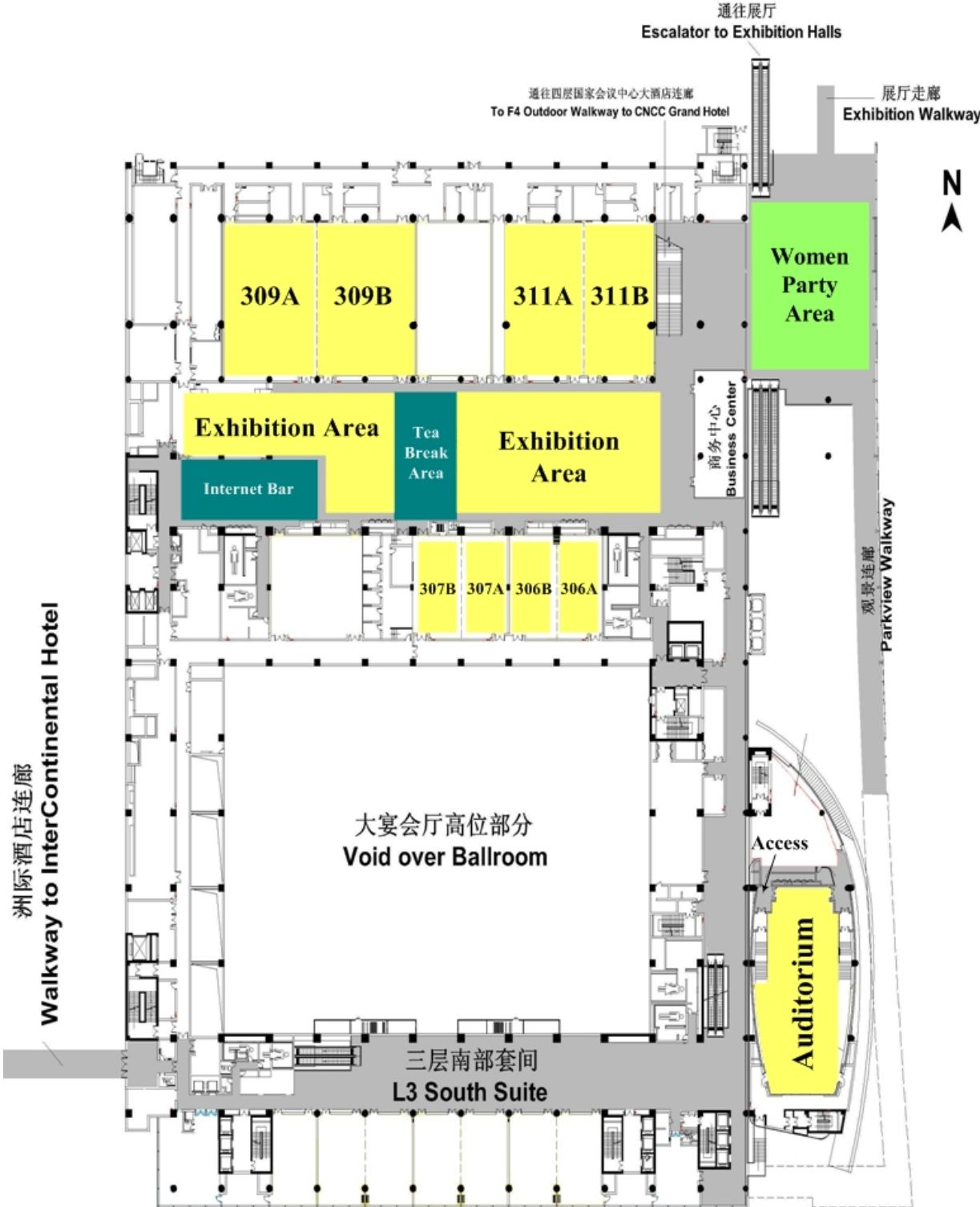
CNCC Situation Map



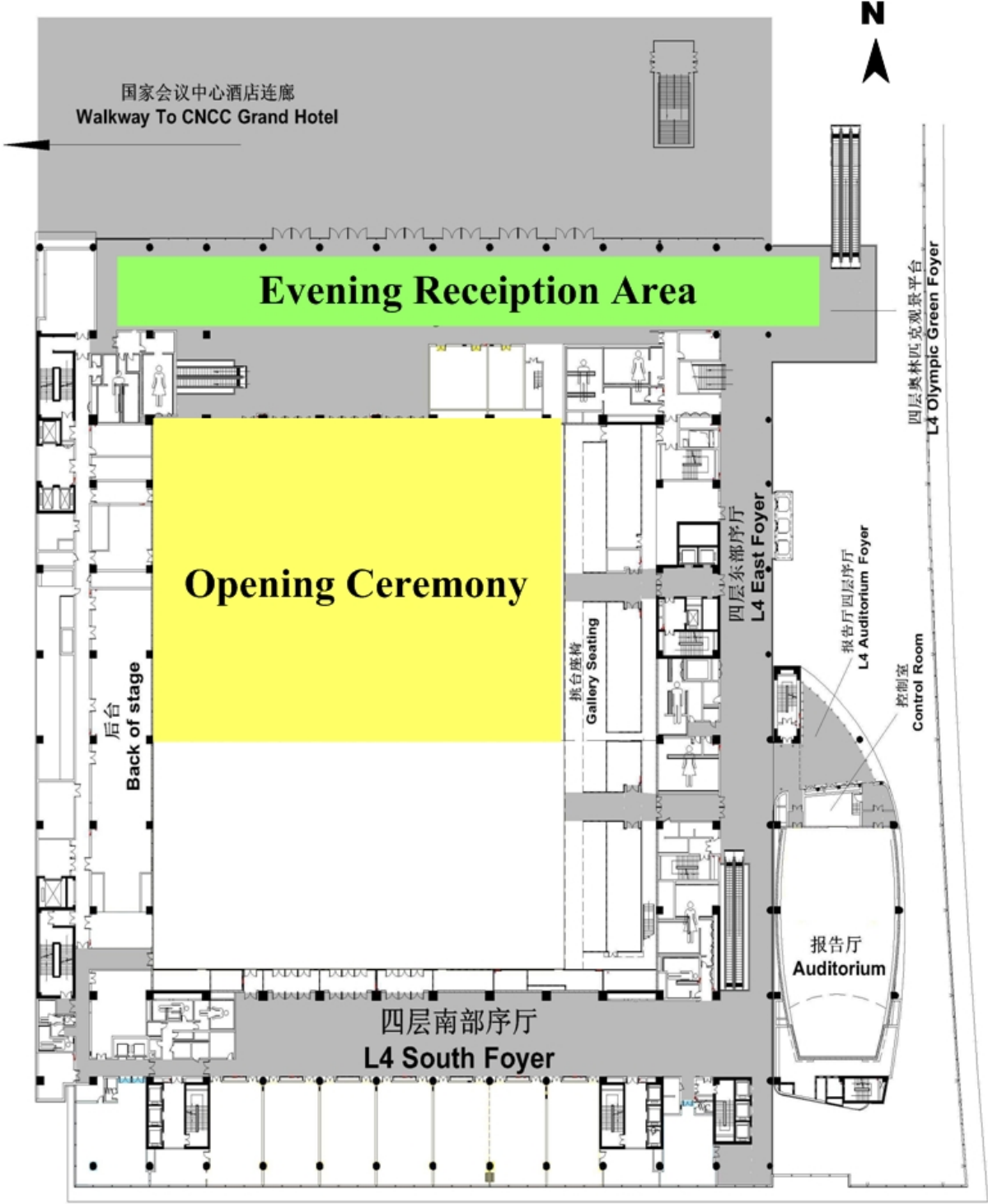
Floor Plan of Level 1 (Conference Area), CNCC



Floor Plan of Level 3, CNCC



Floor Plan of Level 4, CNCC





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Notes



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