



Development of Handheld Biosensors for Point-of-Care Diagnostics International Workshop

Hosted by:

India Institute of Technology Bombay

University of Ulster

University of Waterloo



Sheraton Hotel, Bangalore, India

January 15 2013



Welcome

Development of Handheld Biosensors for Point-of-Care Diagnostics

International Workshop

Welcome!

Thank you for attending our workshop on point-of-care diagnostics. We are all very excited that you could join us for this exciting day of keynote talks, panel discussions, and networking. It promises to be a great opportunity to gain new knowledge, develop new relationships, and to address some of the most important topics in this field.

We would first like to thank our sponsors who have made this event possible. This includes support from the Ontario Ministry of Economic Development's International Strategic Opportunities Program (ISOP), the University of Waterloo's International Research Partnerships Grant (IRPG), the University of Ulster, the British Council, and the Indian Institute of Technology Bombay.

The focus of this workshop is biosensor technology that enables point-of-care (POC) and remote diagnostics for healthcare applications. The widespread adoption of POC diagnostics will usher in a new era of healthcare in both the developed and developing worlds. In developed countries, POC diagnostics will enable patient centric, data driven healthcare integrated into electronic health management systems aimed to reduce costs and increase efficiencies. New diagnostic tools and the rise of personal genomics will improve the prevention and management of many chronic diseases and illnesses to improve the health and quality of life of our nations' people. Developing countries will gain access to low cost diagnostics that can be used to provide essential healthcare services in areas where there are currently none. This will reduce misdiagnosis, curb unnecessary treatment that leads to drug resistance, and reduce the threat and effect of epidemics and pandemics, such as multi-drug-resistant tuberculosis.

Significant progress has been made in POC diagnostics, but to achieve many of the game-changing outcomes that are possible, much work is left to be done. There remain technological obstacles, regulatory hurdles, adoption and reimbursement issues, economic arguments, and political barriers. The "holy grail" of a rapid, laboratory quality, multiplexed device that is a reasonable cost, easy to use, and integrated into electronic health management systems remains elusive.

The goal of this workshop is to identify the challenges and next steps in the development and commercialization of POC diagnostics around the world, and make a plan of action to address these issues. This requires business, health, and scientific experts from a range of backgrounds, with vast knowledge and experience, which is why we have invited you here today.

We hope that you enjoy the workshop.

Sincerely,

Patricia Nieva, Soumyo Mukherji, Matt Vijayan, and James McLaughlin

Workshop Program

Development of Handheld Biosensors for Point-of-Care Diagnostics

January 15th 2013, Jupiter 1 Room, Sheraton on Brigade Gateway

09:00	09:30	Welcome and Registration
09:30	09:55	Speaker 1 - Dr. Patricia Nieva, University of Waterloo Workshop Opening and Overview of Sensor Research at the SIMSLab
10:00	10:25	Speaker 2 - Dr. Zhao Lu, CMC Microsystems From Concept to Products: Enabling a Path to Commercialization for Lab-on-a-Chip
10:30	10:55	Speaker 3 - Dr. James McLaughlin, University of Ulster/Intelesens Point of Care and Healthcare Sensor Systems Developments at Ulster
11:00	11:15	Break
11:15	11:40	Speaker 4 - Dr. Soumyo Mukherji, IITB Development of Optical Fiber and Embedded Waveguide Biosensors
11:45	12:10	Speaker 5 - Dr. Lazar Mathew, PSG Institute of Advanced Studies Development of BIO-MEMS Devices –Current Indian Scenario
12:15	13:15	Lunch and Networking
13:15	14:15	Emerging Research Areas and Funding Opportunities in Biosensors for Point of Care Diagnostics - Panel Discussion <u>Participants:</u> Dr. Patricia Nieva, Dr. Enakshi Bhattacharya, Dr. Ravi Selvaganapathy, Dr. Soumyo Mukherji, Dr. Matt Vijayan <u>Moderator:</u> Ryan Denomme
14:15	14:30	Break
14:30	14:55	Speaker 6 - Ryan Denomme, Nicoya Lifesciences Nanoplasmonic Biosensors for Point-of-Care Diagnostics
15:00	15:25	Speaker 7 - Dr. Dhananjaya Dendukuri, Achira Labs Microfluidic Technologies for Point-of-Care Diagnostics: Experiences at Achira Labs
15:30	15:55	Speaker 8 - Chandrasekhar Nair/Dr. B. K. Iyer, Bigtec Labs Truelab Real-time MicroPCR Analyzer for Near-Care Detection of MTB
16:00	16:15	Break
16:15	17:15	Challenges and New Applications in the Commercialization of POC Diagnostics - Panel Discussion <u>Participants:</u> Chandrasekhar Nair/Dr. B. K. Iyer, Dr. Dhananjaya Dendukuri, Dr. Lazar Mathew, Ryan Denomme, Dr. James McLaughlin <u>Moderator:</u> Dr. Matt Vijayan
17:15	18:00	Open Discussions/Closing Remarks
18:00	20:00	Dinner and Networking


Location: Sheraton Bangalore at Brigade Gateway 26/1, Dr. Rajkumar Road, Malleswaram-Rajajinagar, Bangalore, Karnataka 560055, India

Hotel Number: +91 80 4252 1000



KEYNOTE SPEAKERS AND PANELISTS

Development of Handheld Biosensors for
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2013



PATRICIA NIEVA

University of Waterloo
Associate Professor

Dr. Patricia Nieva received her M.Sc. degree in Mechanical Engineering and Ph.D. degree in Electrical Engineering from Northeastern University, MA, in 1997 and 2004, respectively. She is currently an Associate Professor in the Department of Mechanical and Mechatronics Engineering and the Director of the Sensors and Integrated Microsystems Laboratory, University of Waterloo, Canada. Her main research goal is the use of micro and nanotechnology to design microsensors, nanosensors and integrated microsystems solutions, particularly for harsh environment sensing, point-of-care health monitoring, and medical diagnostics. Her work also spans reliability studies and in-situ characterization of material properties of thin films used in the manufacturing of N/MEMS. Dr. Nieva's ongoing research work constitutes an important commitment to the identification of simple, cost-effective and reliable technologies for advanced sensing.

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ZHAO LU

CMC Microsystems
Staff Scientist

Zhao Lu received a BE degree from ChongQing university (1996), MSc from Chinese Academy of Science (1999) and PhD from Ecole Polytechnique de Montreal (2011). He worked for ZTE Corp. from 1999 to 2002, first as a telecommunication engineer, then as an ASIC engineer and project manager. He joined CMC Microsystem in 2009 as staff scientist and is currently working on microfluidics, microsystem integration, micro-fabrication and technology transfer and commercialization.

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JAMES MCLAUGHLIN

University of Ulster
Professor

Prof McLaughlin, a physicist, and a Fellow of the Institute of Physics has developed significant initiatives within research, technology transfer, outreach and teaching over these past 27 years. Presently, as a Professor in the School of Engineering, he is also the Director of the Engineering Research Institute and Director of NIBEC. His salient disciplines address Connected Health, point of care and related bio-sensing applications. He was recently awarded an OBE for his services to Research and Economic Development in Northern Ireland. He has attained in excess of three hundred publications (H index 22) and he has been honored as an invited speaker at over thirty International Conferences and he has attracted over £32M of funding. In recent years Professor McLaughlin's over-arching strategy is to develop a strong Connected Health Platform within Northern Ireland (as Chair of the European Connected Health Campus) and the EU. A holder of over twenty patents, including one for the world's best selling disposable medical electrode, he has successfully co-founded a set of spin-out companies including the highly successful CH company - Intelesens Ltd. He is the chief technology officer with Intelesens, the Chief Scientific Officer with SiSaF and a Director of a range of other businesses.

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SOUMYO MUKHERJI

Indian Institute of Technology, Bombay
Professor

Soumyo Mukherji did his B.Tech. in Instrumentation Engineering, Indian Institute of Technology (Kharagpur), MS in Mechanical Engineering, Colorado State University (Fort Collins, USA), and Ph.D. in Biomedical Engineering, University of North Carolina (Chapel Hill, USA). He joined IIT Bombay right after his PhD in 1997 as an Assistant Professor, and is now a Professor in the Department of Biosciences and Bioengineering and Head of the Centre for Research in Nanotechnology and Sciences.

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LAZAR MATHEW

PSG IAS, Coimbatore
Professor/Doctor

Dr. T. Lazar Mathew is Advisor, PSG Institute of Advanced Studies, Coimbatore; and Advisor, Centre of Excellence Nanoelectronics, IIT Bombay. He has been Director at various institutions (Institute of Nuclear Medicine & Allied Sciences Delhi, Defence Bio Engineering and Electromedical Laboratory, Bangalore, Life Sciences, DRDO HQ Delhi, St Francis Hospital Ajmer, VIT University Vellore, SIGNET Programme) and Chief Executive of the Society for Biomedical Technology during the last 30 years. Currently, he is Chairman of Biomedical Engineering Committee of TIFAC; Chairman of Expert group on Medical Electronics & Telemedicine of Ministry of Information and Communication Technology and Chairman of BioMEMS group of National Programme on Micro and Smart System (NPMASS). He has 192 research publications, 6 books, 9 patents, and 16 awards including the Scientist of the Year Award of DRDO, to his credit. He represented India in various international fora. He is a Fellow of the Academy of Biomedical Scientists (FABMS), International Medical Sciences Academy (FIMSA) and National Academy of Medical Sciences (FAMS).

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ENAKSHI BHATTACHARYA

Indian Institute of Technology, Madras
Professor

Enakshi Bhattacharya completed her MSc (Physics) from IIT Bombay in 1980, PhD from TIFR Mumbai in 1985 and did post-doctoral work at the National Renewable Energy Laboratory (then SERI), USA from 1986-88. She was a faculty member in the Department of Physics, IIT Kanpur during 1988-91. Since 1991, she has been on the faculty of the Department of Electrical Engineering at IIT Madras and is currently a Professor and the Department Head. Her research area is Microelectronics and MEMS with over 100 published papers in journals and international conference proceedings. She has successfully handled 17 sponsored projects and is currently engaged in 6 projects being the Principal Investigator for three of them. Major ongoing projects are the National Programme on MEMS, Smart Materials and Systems (NPMASS) sponsored Biosensor system for the detection of Triglycerides and the Department of Electronics and Information Technology (DeitY) sponsored Centre for NEMS and Nanophotonics.

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MATT VIJAYAN

University of Calgary
Professor

Professor Vijayan is a Professor and Canada Research Chair (Tier I) in Environmental Physiology and Toxicology at the University of Calgary. He is a leader in the field of stress physiology and his research addresses how animals cope with environmental insults. His research program takes an integrated multi-tiered approach using genes, proteins and other biochemical and physiological end-points to develop sensitive tools (biosensors) to predict long-term and population level damage due to pollutants for environmental monitoring. He has over 120 papers in refereed journals and is currently supervising 9 graduate students and 3 research associates. He is regularly invited to present his research at National and International meetings and at Universities world-wide.

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RAVI SELVAGANAPATHY

McMaster University
Associate Professor

P. Ravi Selvaganapathy is an Associate Professor in the department of Mechanical Engineering at McMaster University. He is also the Canada Research Chair in BioMicrofluidics. He received his B. Tech degree from Central Electrochemical Research Institute, India. He then earned his PhD degree at University of Michigan, Ann Arbor, USA on the topic of microfabricated components for genetic analysis. His main areas of research interest are microfabrication of novel materials and their application to microfluidics; development of components such as micropumps, valves, detectors and light sources; and development of platforms for microfluidic applications in electronic cooling, medical diagnostics, drug delivery and drug discovery. He has over 50 publications in various journals and conference proceedings. He has written 5 invited book chapters and been issued 4 US patents related to MEMS/microfluidic devices.



RYAN DENOMME

Nicoya Lifesciences
Founder and CEO

Ryan Denomme is the founder and CEO of Nicoya Lifesciences, an exciting nanotechnology startup from the Waterloo region. His company is focused on building consumer medical diagnostics on smartphones that are affordable, intuitive, and digitally connected. Ryan obtained his Bachelor of Applied Science in Nanotechnology Engineering, with an option in Management Sciences, from the University of Waterloo in 2010. He received the prestigious Governor General's Academic Medal for outstanding academic performance. He later received his Masters of Applied Science in Mechanical Engineering at the University of Waterloo, in the Sensors and Integrated Microsystems Lab under Dr. Patricia Nieva, where he began developing the core technology behind Nicoya Lifesciences.

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DHANANJAYA DENDUKURI

Achira Labs Pvt. Ltd.
CEO

Dr. Dhananjaya Dendukuri is Chief Executive Officer & Co-Founder of Achira Labs, a Bangalore-based startup that is building microfluidic platforms for point-of-care medical diagnostics. He received his Ph.D. in Chemical Engineering from MIT in 2007, an MASC in Chemical Engineering from the University of Toronto in 2002 and a B.Tech in Chemical Engineering from the Indian Institute of Technology, Madras. Dhananjaya is also a recipient of the Massachusetts Institute of Technology's (MIT's) prestigious TR35 awards in India and the Senturia prize for the best doctoral thesis in micro/nanotechnology from MIT.

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B. K. IYER

Bigtec Labs

Medical Director

Dr. B. K. Iyer, the medical director at Bigtec Labs, is a physician practicing in Mumbai, India for the last 29 years. As a key member of the think tank at Bigtec labs, he helps in identifying medical need-gaps and guides the team with strategic input towards newer therapeutic approaches and novel diagnostic applications. His role in integrating the diverse perspectives / demands of the practising clinicians forms a critical element of the innovative offerings at Bigtec labs. In addition to his clinical practice, he is closely associated with the healthcare industry in the pharmaceutical, biotechnology and healthcare communication space. He also plays a key role in clinical validation and co-ordination with the regulatory authorities.

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CHANDRASEKHAR NAIR

Bigtec Labs

Director

Chandrasekhar obtained his Bachelors and Masters in Chemical Engineering from BITS Pilani. He has worked in Senior Technology Development and Management positions in scientific research. He has extensive experience in developing and managing multi-disciplinary life sciences projects. He is a co-founder of Bigtec, an Innovation Driven New Generation Technologies Company. He has amongst other things, worked on bioprocess modeling and the use of intelligent systems to manage control of biological processes. He has been involved in the visioning and development of computing tools for life-sciences research. His current interests are in the development of rapid, low cost, high quality MEMS based diagnostic products.

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