

## NEWS RELEASE

### **A\*STAR INSTITUTE OF MICROELECTRONICS AND UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN TAKE LEAD IN ESTABLISHING DESIGN PRINCIPLES FOR NANOWIRE SENSORS**

**Singapore, 13 December 2010** — Due to their demonstrated ability to detect biomolecules with exceptional sensitivity, silicon nanowire sensors are widely acknowledged as the most promising means of realising systems capable of providing rapid, low-cost and high-throughput analyses of biological processes. Yet the principles governing their design are still unclear today, hampering further efforts at design optimisation. This is set to change, as the Institute of Microelectronics (IME), an institute of the Agency for Science, Technology and Research (A\*STAR), and the University of Illinois at Urbana-Champaign (Illinois) have entered into a research collaboration focussed on identifying and defining the ground rules for the systematic optimisation of nanowire sensor design as well as the techniques for batch fabrication. The resultant discoveries will pave the way for improved nanosensor stability and device reproducibility — taking the technology a decisive step closer to commercialisation.

The partnership will see IME employing its well-established platform technology for fabricating top-down silicon-based nanowire field-effect transistor (FET) sensors and FET nanoplate arrays designed by Illinois. The devices will be fabricated at IME's 8-inch CMOS (Complementary metal-oxide-semiconductor) and MEMS (Micro-electro-mechanical Systems) fabrication facility. As a means of testing their performance, these devices will be used to detect cancer protein biomarkers, with an eye on eventually utilising them in point-of-care diagnostic systems — an area of application in which nanosensors are expected to have revolutionary ramifications.

"Despite the technological advances made to nanowire sensors in recent times, a number of critical unknowns remain, such as the influence of the surrounding environment and electrostatic screening on nanowire sensor performance," said Dr. Chen Yu, principal investigator for IME's Bioelectronics Programme. "Our collaboration with Illinois will seek to provide the answers to all the lingering questions about nanowire sensor design and fabrication that have thus far hindered the research community's attempts at achieving consistent and reproducible results."

"The interdisciplinary nature of cancer nanotechnology makes selecting a research partner a tenuous affair, as few R&D establishments possess the necessary breadth and depth of expertise and capabilities," said Illinois' principal investigator for this project, Professor Rashid Bashir from the Department of Electrical and Computer Engineering & Bioengineering. "IME came immediately to mind because of the field-leading research it conducts through its Bioelectronics Programme, as well as its world-class silicon fabrication process capabilities and staff of full-time researchers with industry-proven experience."

"The pace of decentralisation in the healthcare industry has turned point-of-care diagnostics into one of the fastest-growing areas in healthcare today, a market expected to be worth over USD 22.5 billion in 2013<sup>1</sup>," said Professor Dim-Lee Kwong, Executive Director of IME. "The fact that nanoscale biosensors

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<sup>1</sup> Source: Overview for SMI's 7<sup>th</sup> annual *Point of Care Diagnostics: Market Adoption and Technology Trends* conference; <http://www.smi-online.co.uk/events/overview.asp?is=4&ref=3452>



are increasingly viewed as pivotal components of point-of-care systems bears testament to the tremendous promise and commercial potential of the research we have jointly undertaken with Illinois.”

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#### **About the Institute of Microelectronics (IME)**

The Institute of Microelectronics (IME) is a research institute of the Science and Engineering Research Council of the Agency for Science, Technology and Research (A\*STAR). Positioned to bridge the R&D between academia and industry, IME's mission is to add value to Singapore's semiconductor industry by developing strategic competencies, innovative technologies and intellectual property; enabling enterprises to be technologically competitive; and cultivating a technology talent pool to inject new knowledge to the industry. Its key research areas are in integrated circuits design, advanced packaging, bioelectronics and medical devices, MEMS, nanoelectronics, and photonics. For more information, visit IME on the Internet: <http://www.ime.a-star.edu.sg>.

#### **About the Agency for Science, Technology and Research (A\*STAR)**

A\*STAR is the lead agency for fostering world-class scientific research and talent for a vibrant knowledge-based and innovation-driven Singapore. A\*STAR oversees 14 biomedical sciences, and physical sciences and engineering research institutes, and nine consortia & centre, which are located in Biopolis and Fusionopolis, as well as their immediate vicinity.

A\*STAR supports Singapore's key economic clusters by providing intellectual, human and industrial capital to its partners in industry. It also supports extramural research in the universities, hospitals, research centres, and with other local and international partners.

Please visit [www.a-star.edu.sg](http://www.a-star.edu.sg) for more information.

#### **About the University of Illinois and Nanotechnology**

The University of Illinois is a world leader in research and discovery, the largest educational institution in the state with more than 71,000 students, 24,000 faculty and staff, and campuses in Urbana-Champaign, Chicago and Springfield. The U of I awards more than 18,500 undergraduate, graduate and professional degrees annually. The Micro and Nanotechnology Laboratory (MNLT) at the College of Engineering is one of the nation's largest and most sophisticated university-based facilities for semiconductor, nanotechnology, and biotechnology research. The laboratory is a user facility that is available for use by university and industry from across the nation. It contains over 8,000 square feet of class 100 and class 1000 clean room laboratory and state-of-the-art ultra-high-speed optical and electrical device and circuit measurements. The bionanosystems area focuses on utilizing the various technologies developed in materials, nanofabrication, devices, MEMS and NEMS to study and solve biological issues.

The University of Illinois Center for Nanoscale Science and Technology (CNST) is the premier center for nanotechnology research, education, and outreach activities. CNST draws its strength from working as a collaboratory involving the Beckman Institute for Advanced Science and Technology, Biotechnology Laboratory, Coordinated Science Laboratory, Frederick Seitz Materials Research Laboratory, Institute for Genomic Biology, Micro and Nanotechnology Laboratory, Center for Nanoscale Chemical, Electrical, Mechanical, Manufacturing Systems, National Center for Supercomputing Applications, and the School of



Chemical Sciences, the NSF-funded Integrative Graduate Education and Research Traineeship on Cellular and Molecular Mechanics and BioNanotechnology (IGERT-CMMB); National Cancer Institute-funded Midwest Cancer Nanotechnology Training Center (M-CNTC); The Center is working towards seamless integration of interdisciplinary research from atoms and materials to devices and systems.

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