

NEWS RELEASE

DARPA FUNDS PARTNERSHIP BETWEEN SINGAPORE'S INSTITUTE OF MICROELECTRONICS AND UNIVERSITY OF WASHINGTON FOR TRIPLE BOOST TO MINIATURISATION EFFORTS

Singapore, 23 December 2010 — Advances in miniaturisation have led to the increasing adoption of microsystems in a wide array of applications. Continued miniaturisation, however, impacts the assembly of the components, the integration of passive components and overall system performance. To address these challenges, the Defense Advanced Research Projects Agency (DARPA) is funding a research collaboration between the Institute of Microelectronics (IME), a research institute of the Agency for Science, Technology and Research (A*STAR) and University of Washington's (UW) Department of Electrical Engineering. The partnership will result in the development of a parallel assembly technique to accurately and efficiently assemble ultrathin chips; a three-dimensional (3D) Micro-Electro-Mechanical-Systems (MEMS) high density capacitor with increased energy storage for portable systems; and a microsensor that detects human dehydration levels.

The research on parallel assembly techniques aims to develop a self-assembly process for repeatable high yield results, countering the common issues that often arise from assembling ultra-small chips. Such issues include the difficulty in the mechanical handling of ultrathin devices, and the reduced efficiency of conventional 'pick and place' techniques. The proposed method will be based on shape matching and will consist of pattern design, chip and substrate fabrication, chip dicing, palletisation, self-assembly and gang bonding.

This collaboration will also develop 3D micro capacitors with significantly increased energy storage density, low leakage, and an extended stable lifetime, which will be indispensable for implantable microsystems. An innovative multilayer, high aspect-ratio nano-structured design is being developed to enhance the capacitance value, and thus the energy storage density, through a substantial increase in the effective area of capacitor plates.

Finally, the joint effort on the dehydration microsensor will work towards enhancing human functionality in situations where access to drinking water may be unavailable or impractical. Detection of early signs of dehydration prior to the actual onset of symptoms will be critical to preventing such heat-related fatalities. The proposed biosensor microsystem will feature a novel configuration where the salivary flow rate can be assessed by an impedimetric analysis.

IME will provide expertise in the development, simulations and early stage fabrication for these developments, while UW will contribute lab-scale process development and theoretical analysis on the parallel assembly technique project and review with guidance consultation on the rest.

Professor Dim-Lee Kwong, Executive Director of IME, said, "These projects mark a promising start to a long-term relationship with the University of Washington and DARPA, both known for their distinguished accomplishments and tradition in excellence."

Prof. Karl Böhringer from UW noted, "With IME's recognised capabilities and expertise in development for industry and beyond, we are confident that our collaborations will come to fruition with pioneering results."

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)

The Agency for Science, Technology and Research (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 seven 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 for more information.

About the University of Washington

The University of Washington is one of the world's preeminent, top-ranked universities and a recognized educator of the next generation of leaders, thinkers and doers. A multi-campus institution comprising UW Seattle, UW Tacoma and UW Bothell, as well as a world-class academic medical center, the UW is a focal point of the Puget Sound region's intellectual and cultural life and a key contributor to Washington's increasingly global reputation as a center of innovation and change. Driven to lead by successfully integrating the full assets of the university and its rich environs to address key issues of pressing human concern, the students and faculty at the UW are making a lasting difference around the world. For more information, visit www.washington.edu.

About the Defense Advanced Research Projects Agency

The Defense Advanced Research Projects Agency (DARPA) is the central research and development organization for the Department of Defense (DoD). The Agency manages and directs research and development projects for DoD and pursues research and technology where the risk and payoff are both very high and where success may provide dramatic advances in support of military missions.

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