



香港城市大學  
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## City University Distinguished Lecture Series

Speaker

**Professor Chang Chun-Yen**

*National Endowed Chair Professor  
President Emeritus, National Chiao Tung University*



# New Horizon of FinFETs with Internal Gate and Negative Capacitance

on

Tuesday, 3 May 2016 at 4:30 pm

at

Connie Fan Multi-media Conference Room

4/F Cheng Yick-chi Building

City University of Hong Kong

Tat Chee Avenue, Kowloon

### Abstract

We have realized the negative capacitance gate FET, for the first time and demonstrated in 2015 and 2016 VLSI, which indicated energy efficient sub-60mV/dec of SS, and 1000x Fast P/E speed, a very large memory windows and  $10^{16}$  endurance "versatile/non-volatile memories". In addition, Professor Chang will present versatile FINFETS with an additional internal gate inside of the fin which can demonstrate the dream characteristics of high Ion simultaneously with low Ioff, larger than 1V tunable Vth with orders of magnitude lower 1/f noises suitable for future IOT applications. If time is available, Professor Chang will present a new magneto-MIM capacitor with 100K times energy storage density than Li batteries.

[T. N. & Solomon, P. M. *It's time to reinvent the transistor. Science* 327, 1600–1601 (2010).]

### Biography

Professor Chang Chun-Yen received BS degree in electrical engineering from Cheng Kung University (NCKU), Taiwan, in 1960; MS and PhD degree in 1962 and 1970 respectively, from National Chiao Tung University (NCTU), Taiwan. He has contributed profoundly to the areas of microelectronics, microwave and optoelectronics.

In 1964, Professor Chang and his colleagues established Taiwan's first and the state-of-the-art Semiconductor Research Center (SRC) at NCTU, which forms the foundation of Taiwan's hi-tech development. From 1977 to 1987, he established the nation's first researches on GaAs, a-Si, poly-Si at NCKU in Taiwan. In 1987, he returned to NCTU, and simultaneously served as the founding president of National Nano Device Laboratories (NDL) from 1990-1997. In 1997, he became Director of the Microelectronics and Information System Research Center (MIRC) of NCTU (1997-1998). In 1998, he was appointed as the President of NCTU (1998-2006). As the National-Endowed-Chair Professor and President of NCTU, his vision was to lead the university into excellence in science, engineering, humanity and art, as well as biological science and technology. In 2002, in order to establish strong system design capability, he initiated the "National program of system on chip" (NSOC). He is a member of Academia Sinica (1996); Foreign Member of the US National Academy of Engineering (2000). Recently, he has worked on the negative C-gate- FINFETs and Power Devices in which, an excellent SS of 31 mV/dec was achieved. [VLSI, technology, 2013 and Kyoto, IEDM2014]. Demonstrated nano sec speed, 1000x faster than flash memories [2015 VLSI-Kyoto and 2016 VLSI-Hawaii.]

Professor Chang contributes to Taiwan's electronics industry, education and material technology. It is also commented that, "Without Professor Chang's leadership, Taiwan's electronics industry could not be so flourished not only to the economy of Taiwan, but also to the world."

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[http://www.cityu.edu.hk/vprt/distinguished\\_lecture\\_series/upcoming.htm](http://www.cityu.edu.hk/vprt/distinguished_lecture_series/upcoming.htm)

Distinguished Lecture Series

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