SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING
Website: https://cde.nus.edu.sg/ece

Area: Microelectronic Technologies & Devices

Host: Associate Professor Ang Kah Wee

TOPIC	:	**Can Two-Dimensional Materials Serve for Future Electronics?**
SPEAKER	:	**Professor Lain-Jong (Lance) Li** **Chair Professor in Nanomaterials** **Mechanical Engineering, The University of Hong Kong**
DATE	:	**Thursday, 17 November 2022**
TIME	:	**3:00PM to 4:00PM**
VENUE	:	**E5-02-32** **NUS College of Design and Engineering, NUS**

ABSTRACT

With the dimension scaling for future electronics technology nodes, the gate controllability becomes weaker owing to the pronounced source-drain tunneling. Hence, the transistor body thickness needs to be reduced to ensure efficient electrostatic control. New materials such as 2D semiconducting materials have attracted attention. In this talk, I would like to provide our analysis and arguments on the possibility to scale the device dimension, for example down to N1 technology node, using transition metal dichalcogenides (TMD) semiconductors.

Foreseeable challenges on materials growth and device fabrication are ahead. Here, I will discuss several advancements we and collaborators have achieved recently. (1) Principle of wafer-scale single-crystal MoS_2 growth for device applications. (2) We discover that hydroxide vapor phase epitaxy enables the growth of WS_2 monolayers with a significantly lower density of structural defects, which make the electron mobility peaked at ~200 cm^2/Vs. (3) Ultrahigh-k dielectrics can be applied onto short-channel (<30 nm) 2D monolayer transistors through van der Waals gap integration. (4) Semimetal is a feasible n-type contact metal to TMD monolayers that can achieve almost zero SB height.

BIOGRAPHY

Dr. Lain-Jong (Lance) Li joined the University of Hong Kong as a Chair Professor in nanomaterials for next-generation devices. He served as a Research Director in Corporate Research at Taiwan Semiconductor Manufacturing Company (TSMC) from 2017 to 2020.

He received his BSc and MSc in chemistry at National Taiwan University. He obtained his PhD in condensed matter physics at Oxford University in 2006. He was an Assistant Professor in Nanyang Technological University Singapore from 2006-2009. Since 2010, he has become an Associate Professor at Academia Sinica Taiwan. He joined King Abdullah University of Science and Technology in 2014 and became a full professor in 2016. He became the adjunct SHARP Professor at University of New South Wales (Sydney) in 2017. He is recognized as the highly cited scholar by Clarivate since 2018 and top 1% scientist by the Universal Scientific Education and Research Network (USERN). He has published more than 400 SCI journal articles with around 49,000 citations.