



國立清華大學  
NATIONAL TSING HUA UNIVERSITY

## Colloquium

Department of Engineering  
and System Science,  
Institute of Nuclear  
Engineering and Science,  
National Tsing Hua University

### Ferroelectric HfZrO<sub>2</sub> FETs for Emerging Technologies

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The prospect of ferroelectric Hf-based oxide by ALD (Atomic Layer Deposition) with bistable states nature feature of hysteresis loops satisfies the demands of the storage signal purpose for memory and the voltage amplification concept for negative capacitance (NC). Si doping in HfO<sub>2</sub> to form a ferroelectric material was discovered by Qimonda AG in 2010; recently, ferroelectric Hf-based oxide materials have been used in many applications, such as memory, negative capacitance, passive component, and solar cells. For the AI (Artificial Intelligence) and IoT (Internet of Things) era, the requirement of scaling down supply voltage VDD and power consumption for low power devices is the pursued goals for CMOS and memory applications. The ferroelectric gate stack is integrated into FETs with NC effect for subthreshold swing (SS) improvement. The feasible concept of coupling the polarization Hf-based oxide is practicable to following current CMOS architectures.

15:30-17:20, Wed., January 6<sup>th</sup>, 2021

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## Biography:



Dr. M. H. Lee (李敏鴻) graduated from the Graduate Institute of Electrical Engineering, National Taiwan University. After he received his Ph.D. degree, he serves as a professor at Institute of Electro-Optical Science and Technology, National Taiwan Normal University. The research direction is prospective transistor-tunneling transistor, negative vcapacitance transistor, silicon germanium carbon transistor, high power device-GaN MOS-HEMT, solar cell-HIT, CIGS, thin film transistor-polysilicon transistor, two-dimensional TMD transistor, flexible transistor.