# Semiconductor Devices Reliability in Nanometer Era

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## ABSTRACT

Reliability degradation due to transistor aging is becoming more challenging as we advance from technology node to technology node. ias Temperature Instability (BTI) is the dominant aging mechanisms in digital circuits. BTI gradually increases the device's threshold voltage (Vth) over the lifetime, which in turn degrades circuit speed, and ultimately, it may cause a faulty operation. Circuit performance degradation due to BTI is highly dependent on the operating conditions such as the executed workloads by the circuit and the operating temperature. Moreover, variability in devices parameter due to process variations aggravate the reliability issues. These effects need to be properly accounted during circuit design phase to obtain electronic products with improved lifetime. This presentation will cover the recent advancements in characterization, analysis and modeling for predicting lifetime induced by negative bias temperature instability that have been conducted at VLSI Reliability Research Group, University Malaya, Malaysia.

## BRIEF BIOGRAPHY

Prof. Ir. Dr. Norhayati Soin received the B.Eng. (Hons.) in Electrical and Electronic Engineering from Liverpool Polytechnic, U.K, in 1991 and M.Sc. degree in Microelectronic and Information systems from Liverpool John Moores University, Liverpool, U.K., in 1998. She received Ph.D. degree in Electrical and Electronic Systems (MEMS Technology) from the National University of Malaysia, Malaysia, in 2006.

She is currently a Professor with the University of Malaya, Kuala Lumpur, Malaysia. Her current research focuses onreliability of semiconductor devices/integrated circuit and MEMS sensor. Norhayati Soin leads the VLSI reliability Research Group and Center of Printable Electronics at University Malaya. She has extensive international collaborative networks and has served as an invited researcher for Liverpool John Moores University, United Kingdom. She has been awarded IEEE Senior Member and currently is the Chair of IEEE Electron Device Society Malaysia Chapter. She was the Chairman for IEEE International Conference in Semiconductor Electronics 2020. She served astechnical committee member for International Symposium on the Physical and Failure Analysis of Integrated Circuits (IPFA)and Electron Devices Technology and Manufacturing Conference (EDTM) technical committee member from 2016. Her work has been published both locally and internationally in more than 150 papers in journals and proceedings locally and internationally.