

# Synopsys and IIT Bombay Announce Release of Sentaurus TCAD Model for NBTI Reliability Simulation of Advanced Transistors

Model Developed Through Collaboration Between Synopsys and IIT Bombay to Simulate Negative-Bias Temperature Instability in FinFET and Nanowire FET at 7nm, 5nm and Below

MOUNTAIN VIEW, Calif. and MUMBAI, India, Dec. 5, 2016 /PRNewswire/ -- Synopsys, Inc. (NASDAQ: SNPS) and the Indian Institute of Technology (IIT) Bombay today announced the release of a Synopsys Sentaurus™ TCAD model for negative-bias temperature instability (NBTI), a key reliability concern for advanced CMOS devices. NBTI has become more critical with the introduction of high-k metal gate (HKMG) processes and is a dominant reliability concern for FinFET, nanowire FET and future devices, contributing to the degradation of the threshold voltage, drain current, and other electrical parameters. The new Sentaurus TCAD model enables manufacturers of advanced silicon processes working in advanced nodes to assess and mitigate NBTI degradation as part of transistor design and process definition.

"Our research over the years identified and characterized the underlying physical mechanism responsible for NBTI and helped create a framework for predictive DC and AC NBTI simulation of planar FETs," said Professor Souvik Mahapatra of IIT Bombay. "Working together with Synopsys, we have extended the model in Sentaurus TCAD for predictive NBTI simulation in FinFET and GAA nanowire FET. The model has been verified against hardware data, covers a wide range of experimental conditions, and has only three parameters for its calibration, making it suitable for practical TCAD simulations."

"Semiconductor manufacturers face many challenges in developing future process nodes due to the rising complexity of transistor architectures and fabrication processes," said Terry Ma, vice president of engineering for TCAD at Synopsys. "With this new NBTI model our customers can simulate NBTI degradation and minimize its impact through the optimization of the transistor architecture in the early stages of technology development."

## Availability

The NBTI model is available in the M-2016.12 release of Sentaurus TCAD and is available for immediate evaluation by customers.

## About IIT Bombay

Indian Institute of Technology Bombay, the second IIT to be set up in 1958, is recognized worldwide as a leader for education and research in various fields of engineering, science, management, design, and humanities and social sciences. It is reputed for the quality of its faculty and the outstanding caliber of students graduating from its undergraduate and postgraduate programs. The institute has 27 academic units. Over the last five decades, more than 42,000 engineers and scientists have graduated from the institute. It is served by more than 600 faculty members considered not only amongst the best within the country, but are also highly recognized in the world for achievements in the field of education and research. Today the Institute is recognized as one of the centers of academic excellence in the country. Over the years, there has been dynamic progress at IIT Bombay in both academic and research activities, including a parallel improvement in facilities and infrastructure to keep it on par with the best institutions in the world. Visit IIT Bombay online at <http://www.iitb.ac.in>.

## About Synopsys

Synopsys, Inc. (Nasdaq: SNPS) is the Silicon to Software™ partner for innovative companies developing the electronic products and software applications we rely on every day. As the world's 15th largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its leadership in software security and quality solutions. Whether you're a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing applications that require the highest security and quality, Synopsys has the solutions needed to deliver innovative, high-quality, secure products. Learn more at [www.synopsys.com](http://www.synopsys.com).

## Editorial Contact:

Carole Murchison  
Synopsys, Inc.  
650-584-4632  
[carolem@synopsys.com](mailto:carolem@synopsys.com)

