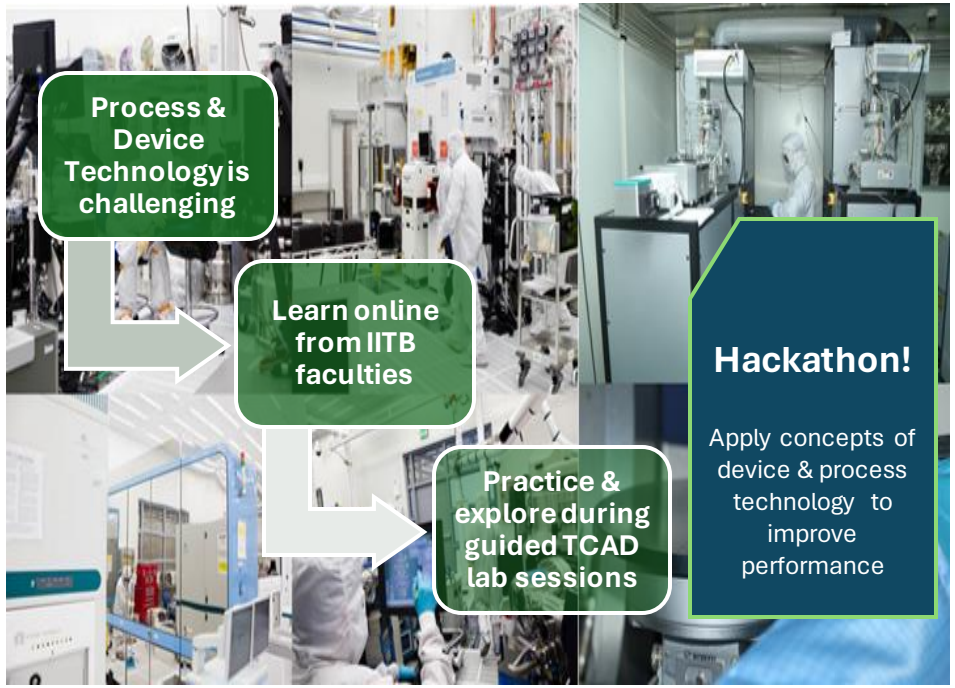
Centre for Semiconductor Technologies (SEMIX)

Evening ● Online ● Lectures ● Hands-on ● Hackathon

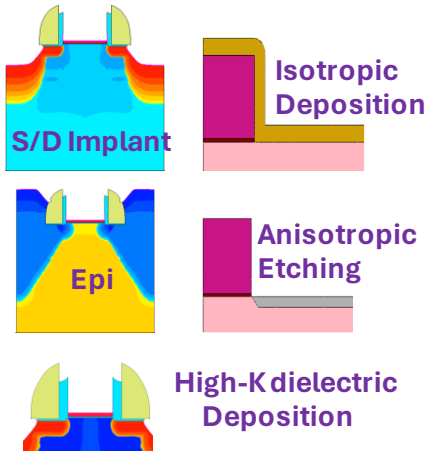
28nm CMOS Device & Process Tech Introductory Course

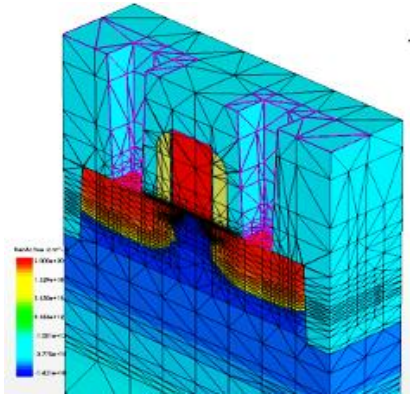
In association with SYNOPSYS® Silicon to Software™

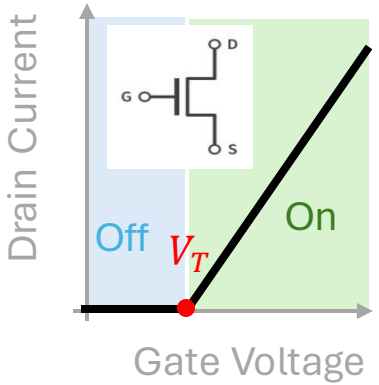
Online Lectures: Introduction to CMOS Fabrication leading to 28nm Transistor Performance



Online Lab: Advanced Transistor Fabrication and Operation explored through TCAD Process and Device Simulations







Build Structure though Si Fab Process Simulation → Simulate electronic physics → Get electrical Performance

Course Coordinators

- Prof. Udayan Ganguly
- Prof. Swaroop Ganguly

Electrical Engineering
Indian Institute of Technology Bombay

17th June to 21st June 2024

Course to be conducted by ***The Centre for Semiconductor Technologies (SemiX) at*** *Indian Institute of Technology Bombay (IITB) in association with* ***Synopsys Inc.***

शैक्षिक प्रसार
Educational Outreach

INUP-i2i IITBNF

Introduction

India has a large semiconductor design ecosystem and making rapid strides to grow IC packaging with 3 major approvals (Micron, Tata, and CG Group) reaching about few billion USD. A 10x higher investment (~ 10 Billions USD) is the IC manufacturing growth with the Tatas proposal approved for 28-130 nm nodes. These new and growing ecosystems will require the semiconductor talent growth to leverage the new opportunities. The talent needs to be familiarized with advanced transistor technology, manufacturing and operations.

We present an **introductory course** to familiarize the participants with the 28nm CMOS technology - a very powerful technology node. It captures a large market share. The **28 nm CMOS technology** is widely used in analog, mixed signal (AMS) IC design, microcontroller and other digital ICs. The Tata Fab projects the 28 nm node as its most advanced offering that is planned. The education ecosystem does not have a very strong hands-on lab capacity at various smaller universities. The online course enables **lectures** coupled with hands-on **TCAD simulations lab** to enable learning-by-doing in a lecture to lab ratio of 1:1. The course also explores the innovative engineering potential through a **hackathon**.

Course Content

The course provides a graded exposure starting with basics and leading to 28nm CMOS device nanofabrication and electrical performance

Basic VLSI & Semiconductor Technology

- Basics of transistor operation.
- Basics of transistor fabrication technology for manufacturing.
- Unit processes & process integration.

Advanced Transistor Technology

- 28nm CMOS transistor fabrication and operation
- Process and device challenges at 28 nm node such as such as source/drain epitaxial stressors for enhanced mobility, high-K dielectrics and metal gate stacks, challenges of lithography, etching and deposition at 28 nm node.

TCAD simulations based lab for process and device technology at 28 nm node

Faculty

Renowned faculty members from IIT Bombay and Synopsys will deliver lectures. Lab sessions will be led by experienced research staff from SemiX / IITB Nanofab Facility.

Broad Objectives

The broad objectives of the course are:

- To learn basics of transistor operation, CMOS fabrication and manufacturing.
- To learn advanced 28nm CMOS fabrication and transistor performance & design though lectures coupled with guided hands on TCAD simulations lab sessions
- To enable learning self-assessment through intermittent exercises and quizzes
- To excite the innovative spirit through a competitive hackathon

Who may benefit?

- **Digital/analog/layout/CAD engineers:** to learn the technology challenges at an advanced nodes, and sources of process & device variation and mismatch.
- **Process & process equipment engineers:** to understand logic device and process, integration flow of 28 nm technology, and to understand the big picture of transistor impact while developing unit processes.
- **Engineers employed in semiconductor industry** but not directly working on advanced technology i.e. devices or process: to learn by hands-on sessions, what the buzz is all about.
- **Research scientists, technical staff** ·
- **Academic faculty and students**
- **Government officials**

Venue for Lectures and Lab sessions

- Lectures - Online
- TCAD Lab- Online via Synopsys cloud
- Hackathon- Online via Synopsys cloud

Registration

https://forms.gle/TW6vRNzTSpYUMxSX8

Fee (Incl. GST)

Rs 9,000/- for students
Rs 18,000/- for faculty from academia
Rs 18,000/- for startup engineers
Rs 27,000/- for government officials
Rs 30,000/- for SemiX IAP members
Rs 36,000/- for industry participants
Rs 108,000/- for Overseas/Foreign National

Important Dates

Last date for receipt of the registration form: 15th May 2024
Course dates: 17th June. to 21st June., 2024
Time: 5:00pm-8:30pm

Contact

For any further queries, please contact us at office.semix@iitb.ac.in or 022-21593930

** Minimum educational requirement is a Diploma or Bachelor's Degree in Science/Engineering*