Semiconductor Memories

ENE 637000
Semiconductor Memories 半導體記憶體

CLASS INFORMATION

- Professor: 林崇榮
- TA: TBD
- Class time/room: 台達館 R212
- Textbook: Handouts
- FTP: **well.ee.nthu.edu.tw ; Login: ene63700 PWD: TBD**

Course Description

In this course, lessons consisting of VLSI semiconductor memory cells and technology by lectures and assigned projects, which developing students' professional VLSI knowledge acquired in the previous VLSI device class. Students learn to know the DRAM, SRAM and Flash technologies. They also learn to design more cell operations, processes and layout details. Extended VLSI integration technology is also addressed and introduced. Cell design and integration will be taught in class and assigned in homework. Memory cell and array for development and production will be drafted for students and aspects of the VLSI industry will be discussed.

Course Outcomes

- Understand VLSI Integration Technology
- Understand DRAM/SRAM/FLASH Technology, Cell Layout, and Integration Process
- Create Basic Cell and Operation from VLSI Process according to Principles of Charge Storage
- Execute the TCAD or Spice Simulation Project for the Optimization of a Cell Design
- Measure and Operate Cell Performance and Characteristics Properly
- Develop Memory Architecture from Read and Write the Bit Cell Developed in High Density Memories
- Apply Basic Cell Technology and Layout to Form More Complex Cell to Cell Interactions
- Manipulate Different Memory Btiline and Wordline and Peripheral Circuit to Compose a New Memory Chip

Semiconductor Memories

- **SRAM**: operation principle, cell structures, TFT loads and fabrication, etc.
- **DRAM**: operation principle, cell structures and technologies, sense amplifier design, architecture and interface, etc.
- **Flash**: operation principles, cell structures, process technologies, and reliability concerns for ROM, PROM, EPROM,EEPROM, Flash, etc.

Class Syllabus and Schedule

	Subject	Syllabus	Week
Part 1	Introduction	Memory Concept	1
Part 2	DRAM	DRAM Concept and Operation	2
		Trench DRAM Technologies	3
		Stack DRAM Technologies	4
		EXAM	5
Part 3	SRAM	SRAM Concept and Operation	6
		4T/TFT/6T/8T SRAM Technologies	7
		EXAM	8
Part 4	Flash Memory	ROM / EEPROM	9
		NOR Flash Memory	10
		NAND Flash Memory	11
		EXAM	12
Part 5	New Memories	RRAM and MRAM	13
		PCRAM and FeRAM	14
		EXAM	15

Grading Policy

- 40% - Homework and Report
- 60% - Exams