

Course Syllabus

집적회로공정 (IC process technology)

Instructor: Sung-Jin Choi

Goal:

To understand “Silicon CMOS process”

To understand “Trends of scaled MOSFET process flow”

1. Introduction to CMOS Technology

Technology trend, CMOS process sequence.

2. Oxidation of silicon

Growth Mechanism (D-G Model), Oxidation rate, Oxidation technique (recipe, equipment), Oxidation pre-cleaning

3. Gate Module Technology

Thin Gate oxide, Tunneling, Reliability, Alternative dielectrics, Gate electrode Engineering, Polycide gate

4. Diffusion

Diffusion processes and profiles (predeposition, drive-in), Diffusion of major dopants, Secondary effects (E-field effect, bandgap narrowing, emitter push, OED, lateral diffusion), Measurement technique

5. Ion Implantation

Simple theory of ion implantation (ion stopping, projection range, channeling), damage and annealing, Equipment related issues (charging, uniformity, and so on)

6. Shallow Junction Technology

Transient-Enhanced Diffusion, pre-amorphization technique, Rapid Thermal Processing, silicidation and Schottky-S/D technology

7. Interconnections and contacts

Semiconductor-metal contacts, Electromigration, Silicide process, multi-level interconnection

8. Lithography

Basic concept of Optical Lithography, Wafer exposure systems, Resolution enhancement techniques

10. CMOS Process Integration

Isolation (LOCOS Isolation, Shallow Trench Isolation), Integration issues in modern CMOS ICs

Reference book:

1. VLSI Technology", 2nd Ed. S. M. Sze, McGraw Hill, 1988
2. "ULSI Technology" C. Y. Chang and S. M. Sze, McGraw Hill, 1996
3. "Silicon processing for the VLSI era" S. Wolf and Tauber, Lattice Press, Vol. 1 (2nd Ed.) 2000 and Vol. 2, 1990.
4. "Silicon processing for the VLSI era" S. Wolf, Lattice Press, Vol. 4, 2002.
5. "The science and engineering of microelectronic fabrication" S. A. Cambell, Oxford University Press, 1996.