CMOS Processing Technology (RP 4.1.12)

Wafer Fabrication: Crystal structure, Defects in crystals, Silicon purification, Czochralski and Float Zone Crystal growth methods, dopant incorporation, wafer preparation

Metrology: Resistivity and Hall effect, Van der Pauw technique, microscopy and defect etches, optical characterization of thin films, ellipsometry, FTIR

Diffusion: Solid solubility, diffusion equation and its solutions, drive-in diffusion, measurement methods – C-V, ECV profilometry, SIMS

Ion Implantation: Equipment for implantation in silicon, Crystal structure and channeling, ion stopping mechanisms, damage production, annealing, different Ion implanter configurations, models and simulation.

Thermal Oxidation: Equipment for Oxidation, dry and wet oxidation, oxidation kinetics, linear parabolic model of thermal oxidation, the Si/SiO2 interface.

Thin film deposition for VLSI: PVD, metallization and sputtering, APCVD, LPCVD, deposition of epitaxial silicon, polysilicon, silicon dioxide and silicon nitride, PECVD, deposition of refractory metals, silicide formation

Photolithography: Light sources, wafer exposure systems, photoresists, alignment, mask design, limits to opical photolithography

CMOS process integration: Cleanroom concepts, CMOS process flow, current trends in nanoscale fabrication