Dersin Kodu	Dersin Adı	Saati	Kredisi
İTN 522	**Introduction to Micro and Nano Fabrication**	**3+0**	**7.5**

Dersi Veren: Feridun AY, Eskişehir Teknik Üniversitesi, İleri Teknolojiler Anabilim Dalı

Dersin Dönemi ve Kontenjanı: Bahar, 20

Ders İçeriği:

Cleanroom environment, safety and processing; Micro-nano metrology; Silicon: Material Properties, Crystal Structure, Growth, Wafers; Thin-film processes: PVD, CVD, PECVD, ALD; Thin-Film Materials and Processes: Metallic Thin Films, Oxide and Nitride Thin Films, Polymer Films, Stresses, Coverage metallic thin films, oxide and nitride thin films, polymer films; Pattern Generation and Optical Lithography: Photomasks as Tools, Lithography Process Flow, Alignment and Overlay, Exposure; Nano and micro-fabrication equipment.

Haftalık ders içeriği:

Contents

Weeks	Topics
Week 1	Introduction & Motivation: History of Microfabrication; Scaling laws (Moore's Law); From micro to nano: definitions and scope; IC vs. MEMS markets.
Week 2	Cleanroom Environment: Cleanroom environment, standards, safety and processing overview.
Week 3	Measurement & Characterization I: Micro-nano metrology methods (Optical microscopy basics; Electron microscopy (SEM) principles and applications etc.).
Week 4	Measurement & Characterization II: Metrology and Physical Properties: Film thickness measurement (Ellipsometry, Reflectometry); Step height and surface profiling; Stress measurement; Sheet resistance and electrical characterization.
Week 5	Silicon I: Electronic properties (Bandgap); Crystal structure (Diamond lattice, Miller indices, Crystal planes [100] vs [111]); Crystal Growth methods (Czochralski vs. Float Zone); Defects in crystals.
Week 6	Silicon II: Wafer Manufacturing & Preparation: Ingot sawing, lapping, polishing (CMP basics); Wafer specifications (Flats, notches);
Week 7	Discussion and assignment of presentation projects
Week 8	Thin-Film Materials and Processes I: PVD, CVD, PECVD, ALD
Week 9	Thin-Film Materials and Processes II: Metallic Thin Films, Oxide and Nitride Thin Films, Polymer Films, Stresses, Coverage
Week 10	Pattern Generation & Lithography: Optical Lithography; Photomasks; Process flow; Resolution limits; Alignment and Overlay strategies.
Week 11	Presentations on assigned micro/nano-fabrication topics
Week 12	Presentations on assigned micro/nano-fabrication topics
Week 13	Presentations on assigned micro/nano-fabrication topics

Weeks	Topics
Week 14	Presentations on assigned micro/nano-fabrication topics