

Growth and Characterization of Semiconductors (RP 4.1.11)

Thermodynamics of crystal growth: solution thermodynamics, phase diagrams, equilibrium at solid/vapor interface, stoichiometry and doping, Adsorption and Desorption, adatom motion, surfactant action

MOVPE: Kinetics of growth, homogeneous and heterogeneous reactions, hydrodynamics and mass transport, reactor design, in-situ controls and safety

MBE: Vacuum requirements, cryopanelling, effusion cells, gas source MBE, electron-beam evaporation, RHEED, AES and SIMS

Characterization: XRD, Resistivity, Carrier and doping density, contact resistance, defects and carrier lifetimes, optical characterization.

Heterostructures: Dislocation and stress relaxation, growth of superlattices, strain measurement by TEM and XRD, growth of HBT and HEMTs.

Fabrication of Optoelectronic Devices: Light Emitting Diodes, photodetectors, edge emitting and surface emitting lasers, solar cells, intersubband transition based devices: QCL and QWIP
Nanofabrication: VLS technique, direct assembly of nanostructures, electron-beam lithography, imprint lithography, carbon nanotubes