

Measurement of: Photoluminescence spectroscopy

Equipment: Self Assembled PL spectroscopy Instrument with diode LASER (Excitation wavelength ~405 nm) & Bentham monochromator 2600.

Property Measured: Photoluminescence emission and excitations of luminescent materials

1. Band gap determination,
2. Impurity levels and defect detection
3. Recombination mechanisms
4. Surface structure and excited states

Photograph (small size)



Basic Principle:

A typical PL experiment in semiconductor can be divided into three stages: Firstly, the sample is excited from ground state, which is a completely filled valence band (VB) to the empty conduction band (CB). Energy pumped for excitation is $\hbar\omega$ pump. The laser creates electron-hole pairs due to a transfer of electrons from VB into CB. Secondly, the non-equilibrium electron and hole distributions tend to relax into the ground state. The initial intraband relaxation is caused by energy transfer to the crystal lattice, i.e. a step by step excitation of lattice vibration. Finally, the electron-hole pair recombines accompanied by the emission of light which is a photoluminescence process.

Capabilities: Photoluminescence spectrometer has following salient features:

- Measurement Range 420-850 nm.

Sample Requirement: Either Solution samples (very diluted) or Thin Films samples.