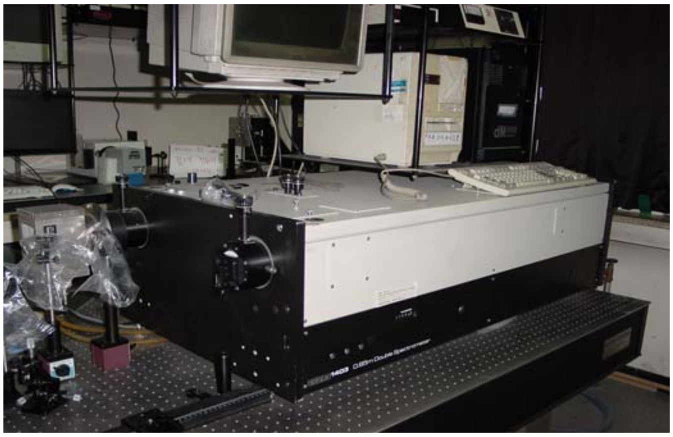
Raman spectroscopy System

Raman Equipment & Application



- Applications - Study of
  - thin films coatings
  - microelectronic integrated circuits
  - mineral inclusions
  - pigments in art works
  - identification of plastic explosives
  - biological tissues and others.

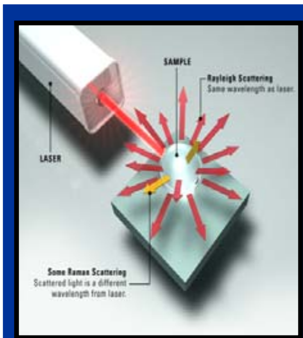
Principle of Raman

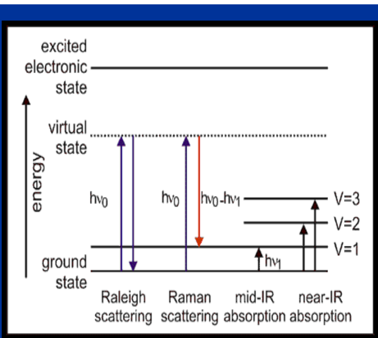
Raman Spectroscopy - spatial resolution close to micron.

- Principle - The sample is illuminated with monochromatic light (a laser) and the light scattered by the material is analyzed by a conventional optical microscope coupled to a Raman spectrometer.

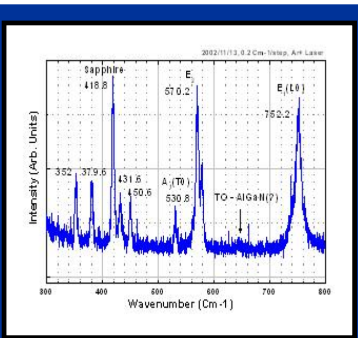
Only a very tiny amount of the total scattered light experiences a frequency shift, which is characteristic of the chemical bonds or molecules present in the material. This inelastic scattering of light is called the Raman effect. The analysis of the scattered frequencies (Raman spectroscopy) gives information on the material chemical composition, state, aggregation, and even factors like stress, orientation, or temperature.

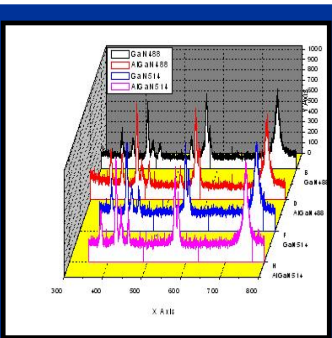
Raman Scattering





Raman Spectra (AlGaN)





- Raman spectroscopy identifies molecular species on a surface from scattered light.
- If a laser beam (monochromatic light) is directed at a material?s surface, some of the light is scattered at the same wavelength of the original beam (Rayleigh scattering), but some of the scattered light loses energy and changes wavelength after interacting with atoms on the surface (Raman scattering).
- The lost energy vibrates molecular bonds and rotates molecules about their bonds. Each molecular bond or bond rotation causes a unique energy loss and subsequent shift in wavelength of the original beam (Raman shift).
- Measuring the wavelength shift allows the identification of molecular species on the sample surface.