

Visible light scattering: Rayleigh, Raman and Brillouin technique

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The interactions between electromagnetic radiation and matter are the most important probes of structure and dynamics on matter. The adsorption, the emission and the scattering of ultraviolets, visible, infrared and microwave radiation has provide detailed information about electronical, vibrational and rotational energy levels in molecules and solids.

The seminar deals with spectroscopic techniques and in detail with the visible light scattering: when a photon in visible range impinges on a material, we can have an elastic scattering (Rayleigh scattering) or an inelastic one (Raman and Brillouin scattering). Both phenomena represent an inelastic scattering process of light with quasiparticles (for example phonon).

These techniques provide very different information about the sample: Raman is used at most to determine the chemical composition and the molecular structure while Brillouin scattering measures properties on a large scale, such as the elastic behaviour.

Today Raman and Brillouin techniques are important for a lot of studies: in nanophysics, for example, we can study the nanotubes vibrations and the dynamics of some amorphous materials used to obtain high tech photovoltaic cells.

