

Definitions

Irradiance. This is the power emitted by the body per unit area and wavelength ($W \cdot nm^{-1} \cdot cm^{-2}$). Furthermore, the irradiance of a lamp that is showing is similar to a black body. **Emissivity.** It is the ratio of the irradiance of the lamp and a black body at the same temperature: $Emissivity (e, \lambda) = I(lamp) (E, \lambda) / I(black\ body) (E, \lambda)$. **Cuerpo gris.** This occurs when the emissivity is independent of the wavelength of the lamp in question. **Deuterium Lamp.** It is a low pressure lamp that has a smooth continuum between 200 and 400 nm, and from this last value the spectrum is more irregular with a large number of peaks. It also has a life of a few hundred hours. La QTH lamp (quartz-tungsten-halogen) issues more visible in the Deuterium in the visible, whereas in the ultraviolet is reversed. For this reason, spectrophotometers Deuterium lamps are used between 190 and 320 nm, while from 320 to 3000 nm using QTH lamps. **Mercury Lamp.** It is a low pressure lamp whose bulb contains a gas, usually containing atoms of Mercury. What you do is pass a current through the gas to ionize and excite both molecules it contains. The light exiting the lamp is mainly due to the intrinsic emission of these molecules. One particular example of such lamps are those of Mercury-Argon (Hg-Ag) or the Mercury-Neon (Hg-Ne). The process leading to emission of radiation can be expressed as: $e + Hg + E_c \rightarrow Hg + e + E_c'$. As the excitation of mercury occurs only for certain energy levels of the same, the spectrum will be composed of discrete and monochromatic lines due to transitions out voltage of mercury. **Xenon Arc Lamp.** The gas that have within them is Xe. In their spectra emission lines are observed between 750 and 1000 nm. They are used to mimic the solar spectrum, since the spectrum of a lamp of this type can be approximated by a black body at a temperature between 5000 and 6000 K.

Xenon Arc lamp with Hg. Usually the Xe arc lamps are usually added mercury, so that you have a lamp of high pressure Xe-Hg. Overlapping emission spectra with those of Xe Hg, ie, the spectrum of a lamp of this type will be more or less smooth because of the continuous emission of Xe, except in a certain frequency range in which peaks appreciate due to emission of Hg. These peaks of Hg widen due to the interaction of the molecules of mercury with the surroundings. **Detectivity (D).** It is the inverse of the NEP is therefore a good detector must have a high detectivity. For most of the infrared detectors is that D is inversely proportional to the area of the detector and the frequency bandwidth $D \propto f^{-1/2}$ (raised to a power). Therefore, to compare different detectors defines specific detectivity (D^*) and $D^* = D \cdot \sqrt{Area}$. The larger the sensor area, the greater the thermal noise and therefore not very appropriate for the sensor area is too large. **NEP (Noise Equivalent Power).** Radiant power is needed (in W) so that the detector gives a signal equal to the noise of the detector. Ideally, where as small as possible, which is achieved by cooling the detector. Many times to cool the detector is used as liquid nitrogen. **Time response of a detector.** It is not that a switch gives the signal as it comes, but has some delay due to the time it takes to convert and amplify the light signal into a current signal. Then, we define the time constant of a detector, as the time it takes to give 63% of the total signal will give us the output. The smaller the time constant of a detector faster will be the same. **Range of linearity of a detector.** This is the range in which the detector response is proportional to the intensity of light that is coming. It is interesting to know the range of linearity of the detector for this range of work will be the same. **Photoconductive detector.** The photoconductors are a material whose conductivity changes when illuminated. Thus, candidates are being photoconductive semiconductors. What happens is that when you get the photon excites the electron from the valence band to conductive band, making the material more conductive.

The most commonly used to build semiconductor photoconductors (used in optical spectroscopy) are: silicon, germanium and lead sulphide. The schematic of a photoconductor detector consists of an electrical circuit connected to a battery and a resistance plus the resistance of photoconductor, what is done is to measure the current intensity which will vary according to the conductivity of the

photoconductor. Fig. Schematic of a silicon diode detector photoconductive mode. When light is incident on the silicon will be more driver and increase the current in the ammeter. **Photodiode or photovoltaic detector.** They are constructed by the union of a p-type semiconductor n-type with another. It has the potential difference that exists between the region p and the n region is proportional to the amount of light that comes, because more light reaches the largest number of electron-hole pairs are created. It is desirable that the detector has just the sensitive area that we will use, because if we had more noise than necessary would be greater still get worse detector. Cuando photons with energies greater than the gap of the excited electrons and electron pairs are -gap. If these pairs are close to the transition region the electrons in the p side holes go to n side n go to p. The electron-hole pairs created far from the transition zone will recombine before llegar. Estos detectors can be used by measuring the current through or by measuring the voltage appearing between p and n region to have an impact on them with light. **Dynode.** A component of the photomultiplier. The multiplier is the same relating to the dynode, ie where the number of electrons increases. Among the dynode is a voltage divider so that the tension between them melts away and thus ensure that each liberated electron is accelerated towards the next dynode. **Photocathode.** It is the very material on which the photoelectric effect occurs. For the electron can be measured at the output that is done is create a very high voltage difference between the photocathode and first dynode, then to begin to collide with the dynode on its way to the anode more electrons are released to produces a current (jet stream) that is measurable. The photocathode and dynode have a certain rate of thermionic emission that is responsible for the dark current. **Dispersion in a monochromator.** Is defined as width at half height = x width Slit Scattering. If we have a monochromator with a dispersion of $D = 1.4 \text{ nm / mm}$, and we know that the width of the entrance and exit slit is 1 mm, then the width of the peak at half height would be 1.4 nm. **Thermopile.** A type of thermal detector, which operate by heating. That is, when a light signal reaching the detector, it is heated and its temperature changes, causing some physical property change it. The thermopile is based on the "Seebeck Effect", which is the effect of the thermocouples, and where the heating of the detector produces a voltage in the same that can be measured. **Pyroelectric.** In this type of thermal detector, what happens is that the temperature increase in the detector makes the polarization within the material (ferroelectric) to vary can be measured. **Optical density.** It is a practical measurement of the absorption, and is defined as: $DO(E) = \log(I_0(E) / I(E))$ Is directly proportional to material thickness (d) and therefore to the concentration of absorbing centers. Would, therefore, an absolute measure of the concentration assumed known absorption cross section s, or its determination whether an alternative procedure, we measure the concentration of absorbing centers. **Absorption coefficient and its relation to the Optical Density.** It will be some function of the wavelength of the incident radiation, $\alpha = \alpha(\lambda)$. Abs coefficients are related to fundamental properties of the medium. Let's see how to obtain experimental information about them and its dependence on wavelength. The light produced by a suitable source for studying the spectral range is dispersed and selected by an element monochromator (prism, diffraction grating), then being sent through the sample to a detector that eventually transform the information into an electrical signal that allows almacenamiento. La registration and the optical density ratio with the absorption coefficient is: **$\alpha = 2303 DO / d$** **Work function (f).** It is the energy invested by the photon remove an electron, which together with the kinetic energy absorbed by the electron, add the total energy of the incident photon. So that: $h\nu = \phi + 1/2 m_e v_e^2$. This is called the photoelectric effect. The minimum energy to free an electron is when the electron has no kinetic energy once released, therefore: $h\nu_0 = \phi$.