Pulse photoelectric spectrometer

Description/Parameters

The photoelectric spectrometer (Instytut Fotonowy, Krakow, Poland) is a scientific instrument used to characterize the photoelectric properties (photocurrent, photovoltage) of semiconductors irradiated with light of various wavelengths. The wavelength of the incident radiation can be freely adjusted using a monochromator integrated into the system.
The photosensitivity of the investigated semiconductor sample is determined using an electrochemical cell consisting of three electrodes and irradiated by a water-cooled 150 W xenon lamp. The working electrode is an ITO PET film (a mixture of SnO_2 and In_2O_3) coated with a thin layer of the tested material with an area of 0.785 cm^2. The reference electrode is Ag/AgCl in contact with the electrolyte (0.1 M KNO_3), and a Pt wire serves as the counter electrode.
The advanced spectrometer software enables direct recording of photocurrent action spectra and allows determination of the ratio of incident photons to converted electrons (IPCE), as well as—using an integrating sphere—the ratio of absorbed photons to converted electrons (APCE), both as a function of wavelength and applied bias potential.
The ability to measure photocurrent under white light irradiation enables comparison to verify whether band gap narrowing has been successfully achieved.

- Sample amount: 20 mg
- Thin film preparation using a film applicator (Elcometer 3570/1, UK)
- Available wavelengths: 250–1000 nm with a 10 nm step, or white light
- Maximum light intensity: 35 mW/cm^2; more than 10 mW/cm^2 across most of the spectral range
- Applied potential: −0.2 to 1 V (vs. Ag/AgCl) with a 0.1 V step

Utilization/Services

Characterization of powdered semiconductor materials and thin films. The instrument is used for rapid prediction of photocatalyst activity at a given wavelength.