

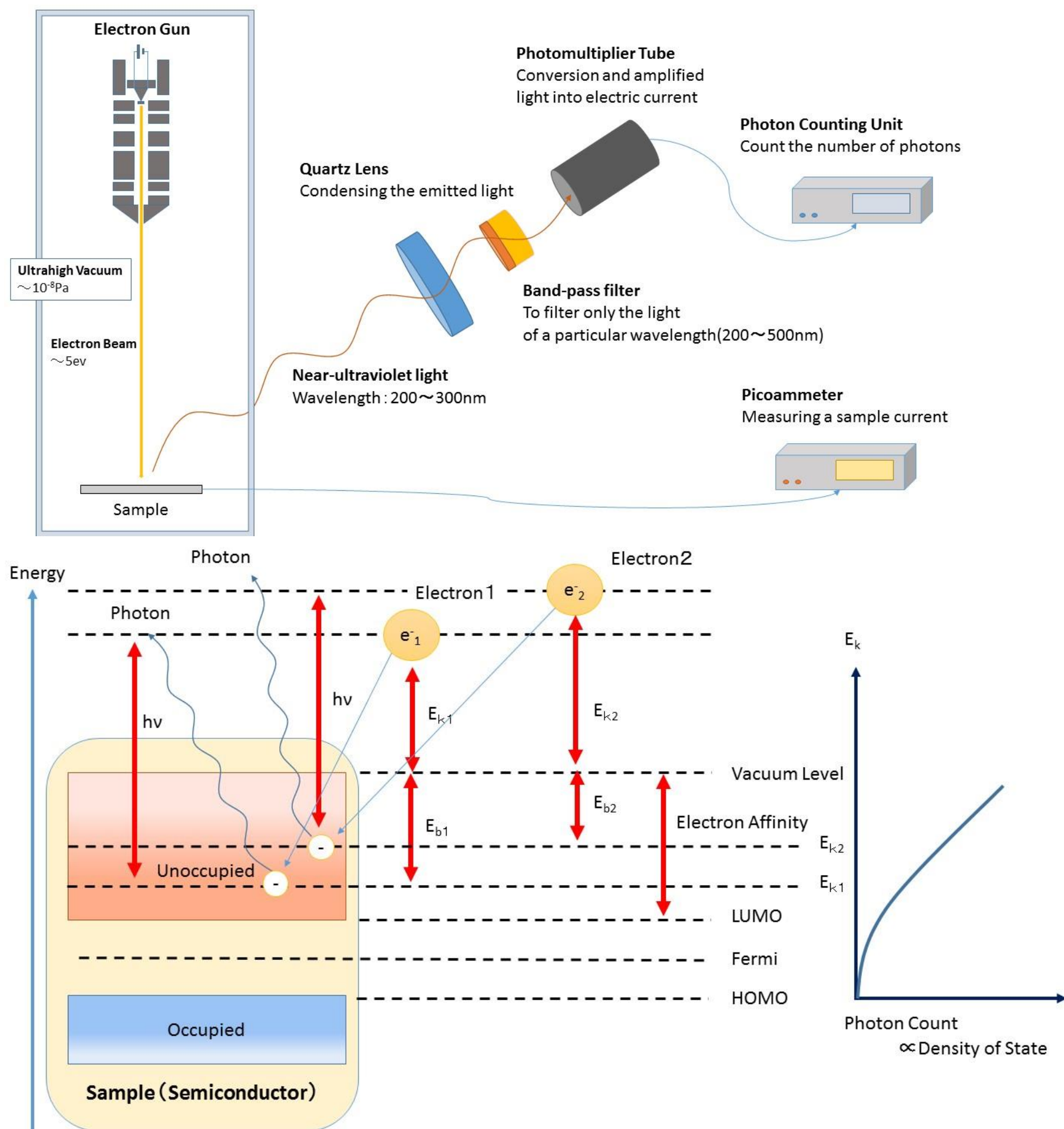


IPES (Inverse Photoemission Spectroscopy) is a unique technology that can probe the density of **unoccupied electronic states (conduction levels)** of the solid surface. It is examined as the reverse process of the probing technique such as XPS or UPS, which are widely used as a tool to know the electronic state of the solid occupancy level (valence band). Our LEIPES is a more enhanced technique than conventional IPES which is achieved from design in our own electron source. Our electron source is able to work in Ultra-Low energy ($\sim 5\text{eV}$) and a narrow energy distribution that can be used on an organic molecular sample without damaging. Our LEIPES functions in Isochromat mode, probing electron incidence photon from the sample which has wavelength corresponding to the relaxation energy transitions to unoccupied levels. It is able to determine Vacuum, Fermi, LUMO level, and also electron affinity.

This product is commercialized more patent licensing agreement with Kyoto University.

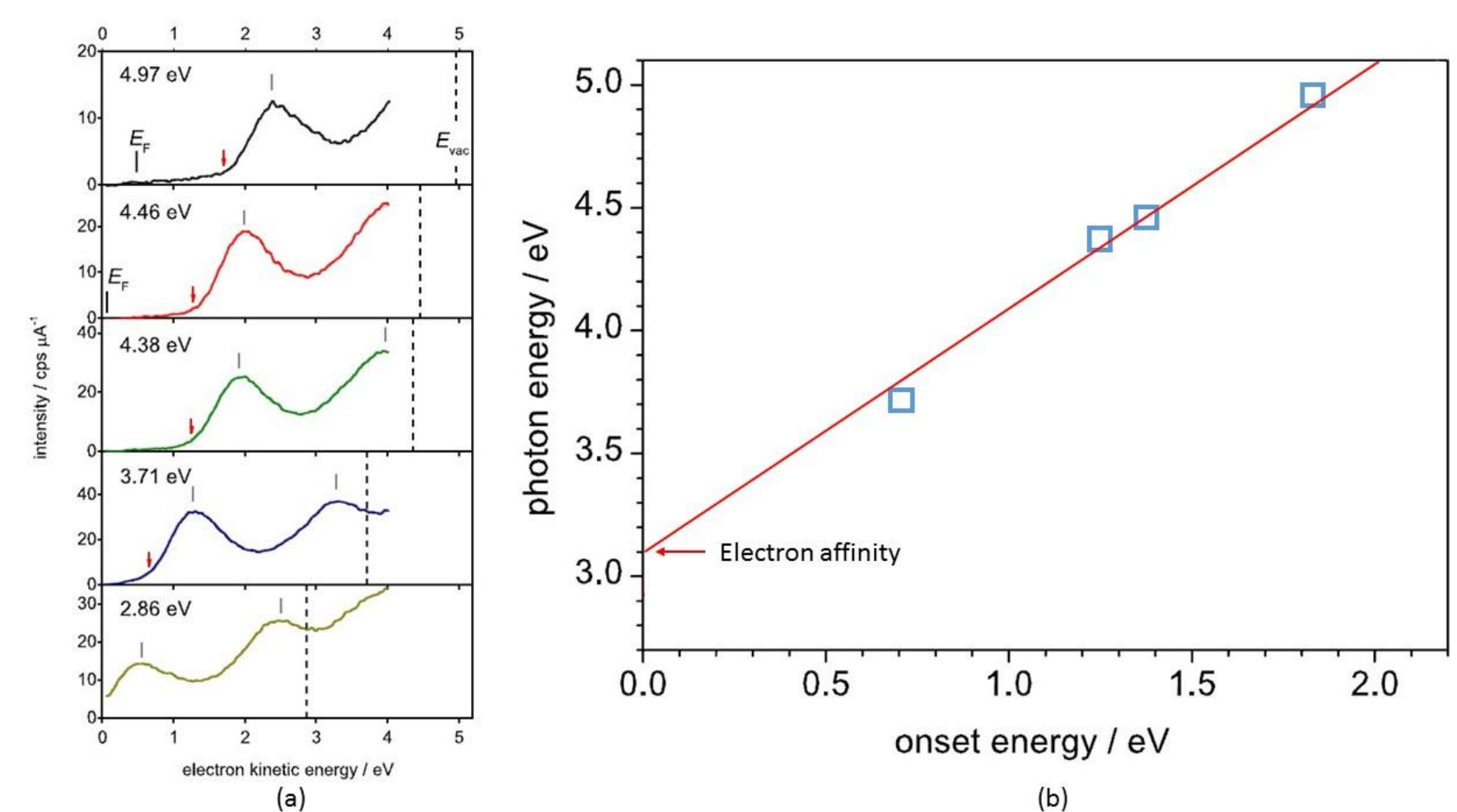
Bibliography : H.Yoshida, *Chem.Phys.Lett.*539-540,180(2012)

Measurement Principle



Electron affinity precision measurement

Example to detect the electron affinity with use the several range of the BPF (Band Pass Filter)

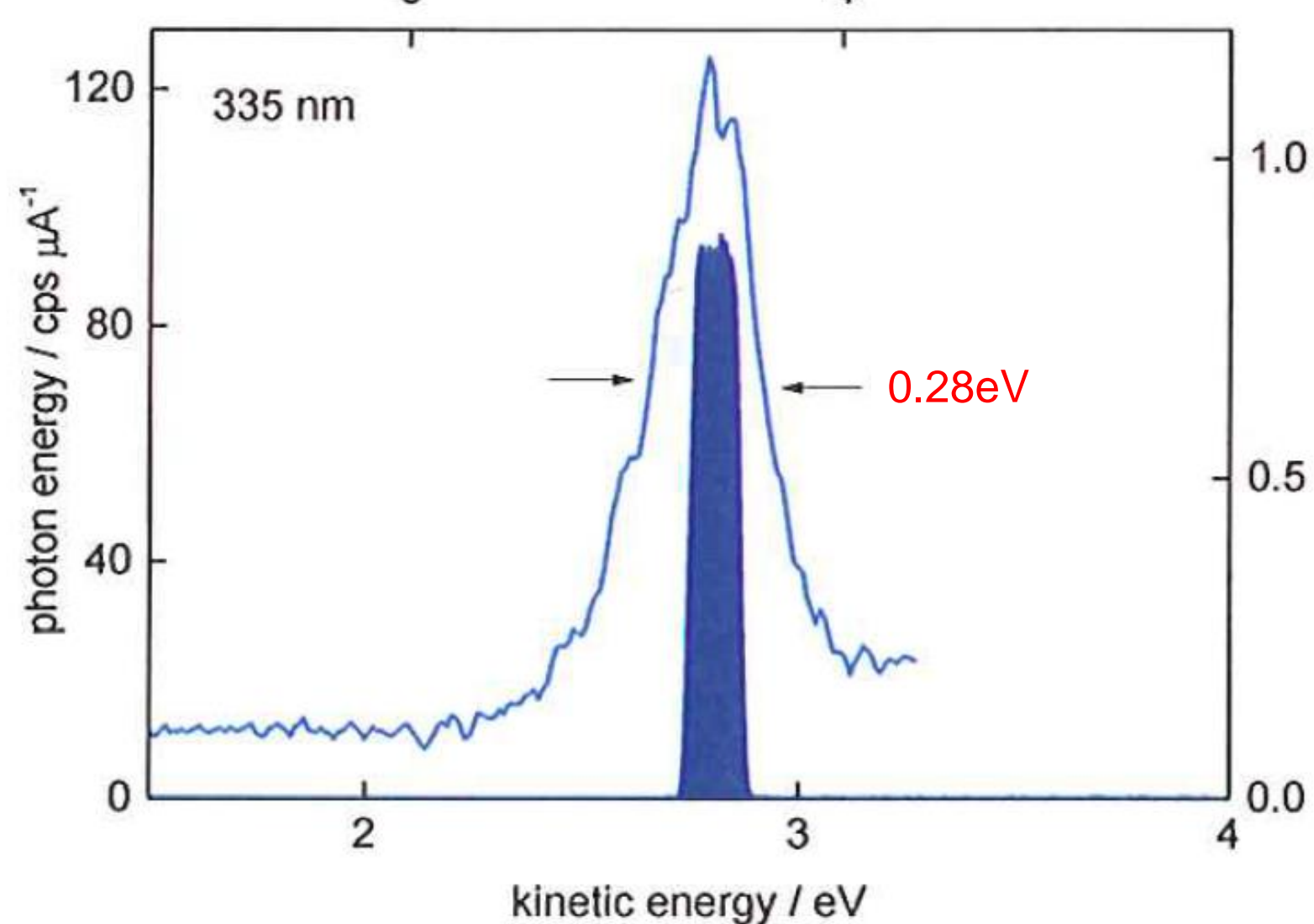


(A): it shows a red arrow rising position in the spectrum of each wavelength.
(B): a plot of the energy of photon to observe the rising position, fitting a straight line of slope 1 who is seeking the electron affinity.

< Reference > Chemical Physics Letters 539-540 (2012) 180-185 (Hiroyuki Yoshida)

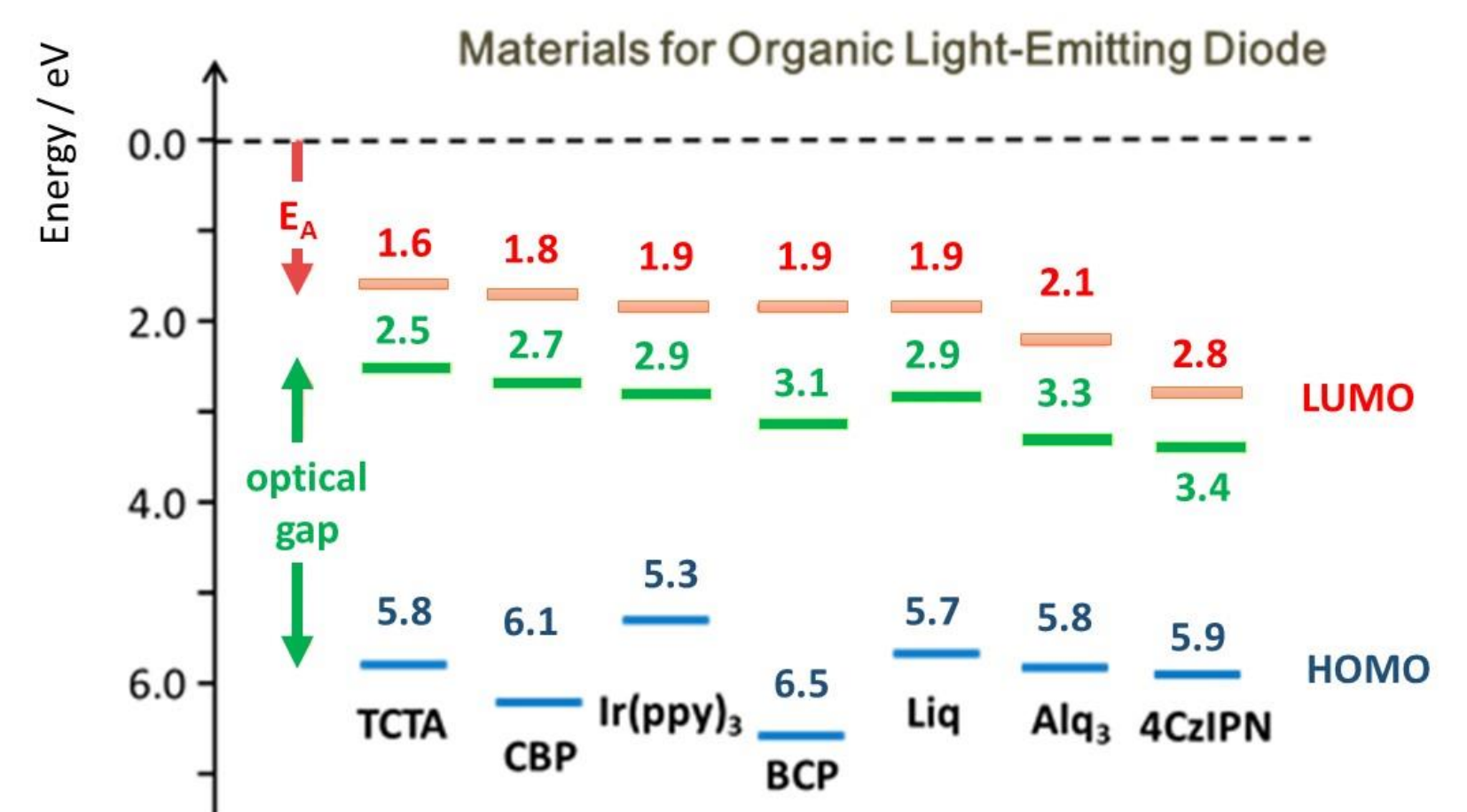
Resolution of the apparatus

Result of measuring the image potential states of HOPG.
Analysis in **0.28 eV** which is used with BPF resolution 0.09 eV (center wavelength in 335 nm)



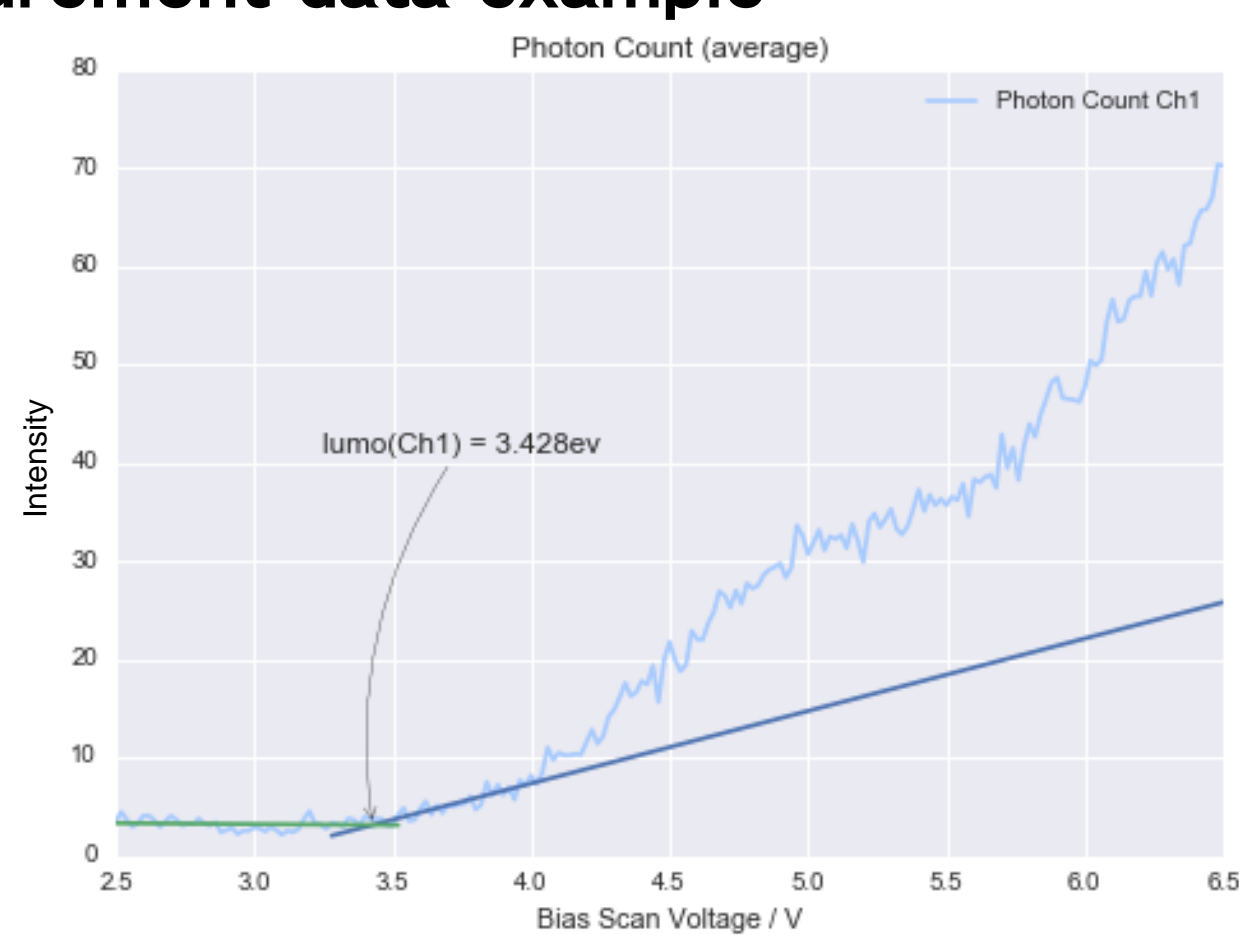
Electron affinity measurement of the organic EL element

To show the electron affinity testing result of 30 kinds of typical organic materials for EL elements. There is a difference of 1 eV also lower than conventional states of data.

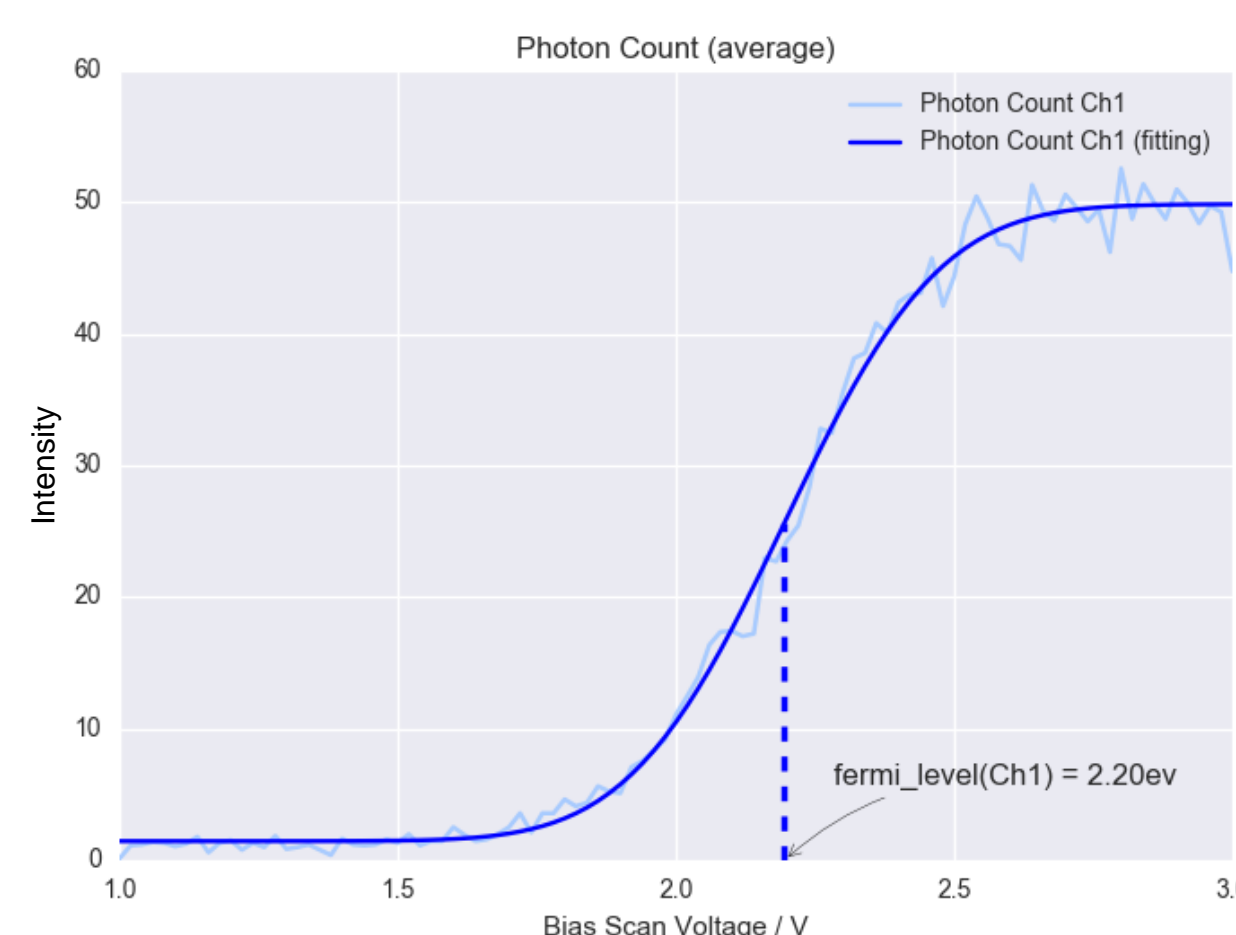


※With respect to the measurement data, it does not guarantee a measure of our apparatus.
<Reference> H. Yoshida, K. Yoshizaki, "Electron affinities of organic materials used for organic light-emitting diodes: A low-energy inverse photoemission study", *Org. Electron.* 20, 24-30 (2015).

Measurement data example



Organic semiconductor



Ag

Detector image

