

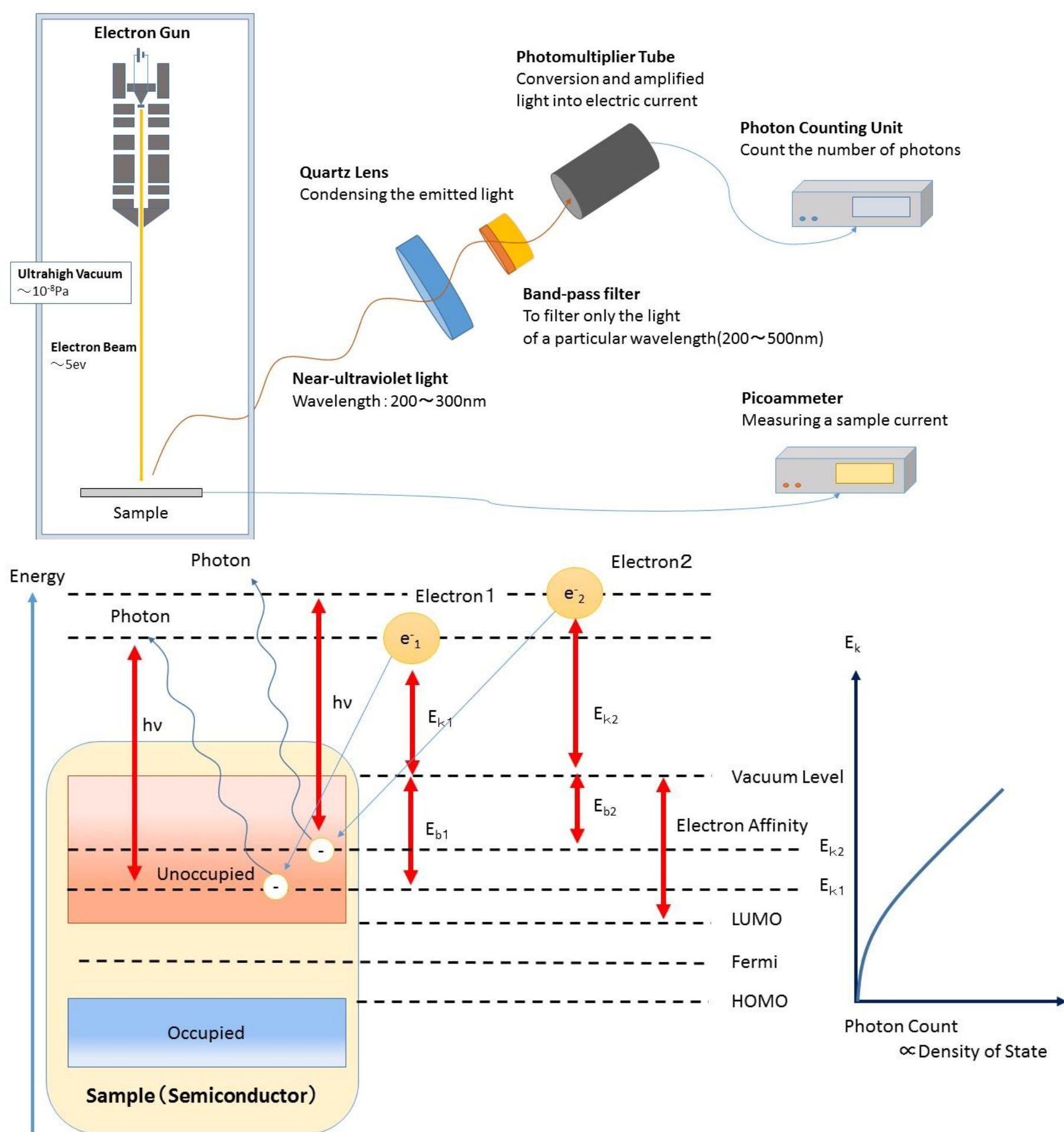


IPES (Inverse Photoemission Spectroscopy) is a unique technology that can probe the density of **unoccupied electronic states (conduction level)** of the solid surface. It is known as the reverse process of the probing technique such as XPS or UPS, which was widely used as a tool to know the electronic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

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

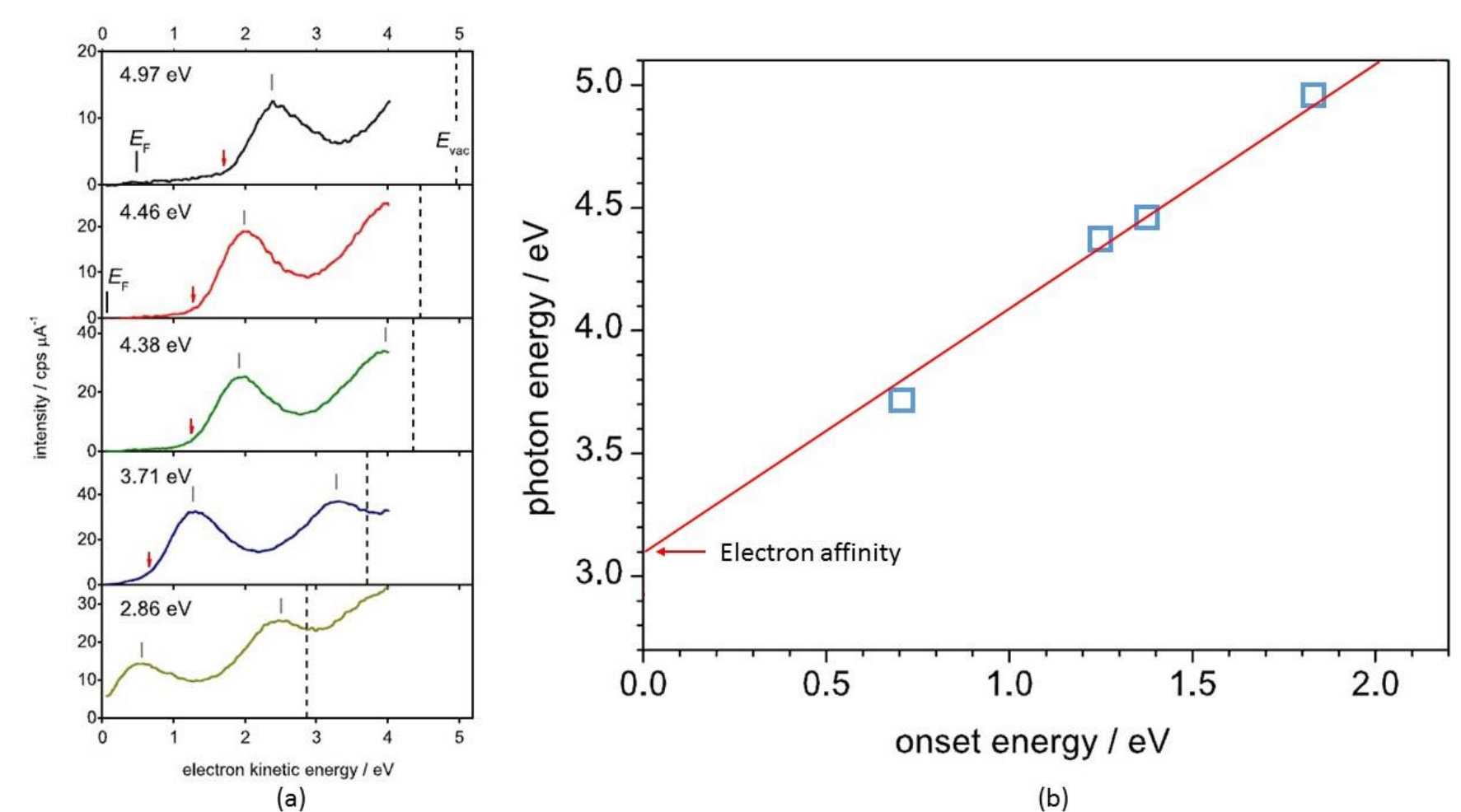
Bibliography : H.Yoshida, *Chem.Phys.Lett.*539-540,180(2012)

### Measurement Principle



### Electron affinity precision measurement

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

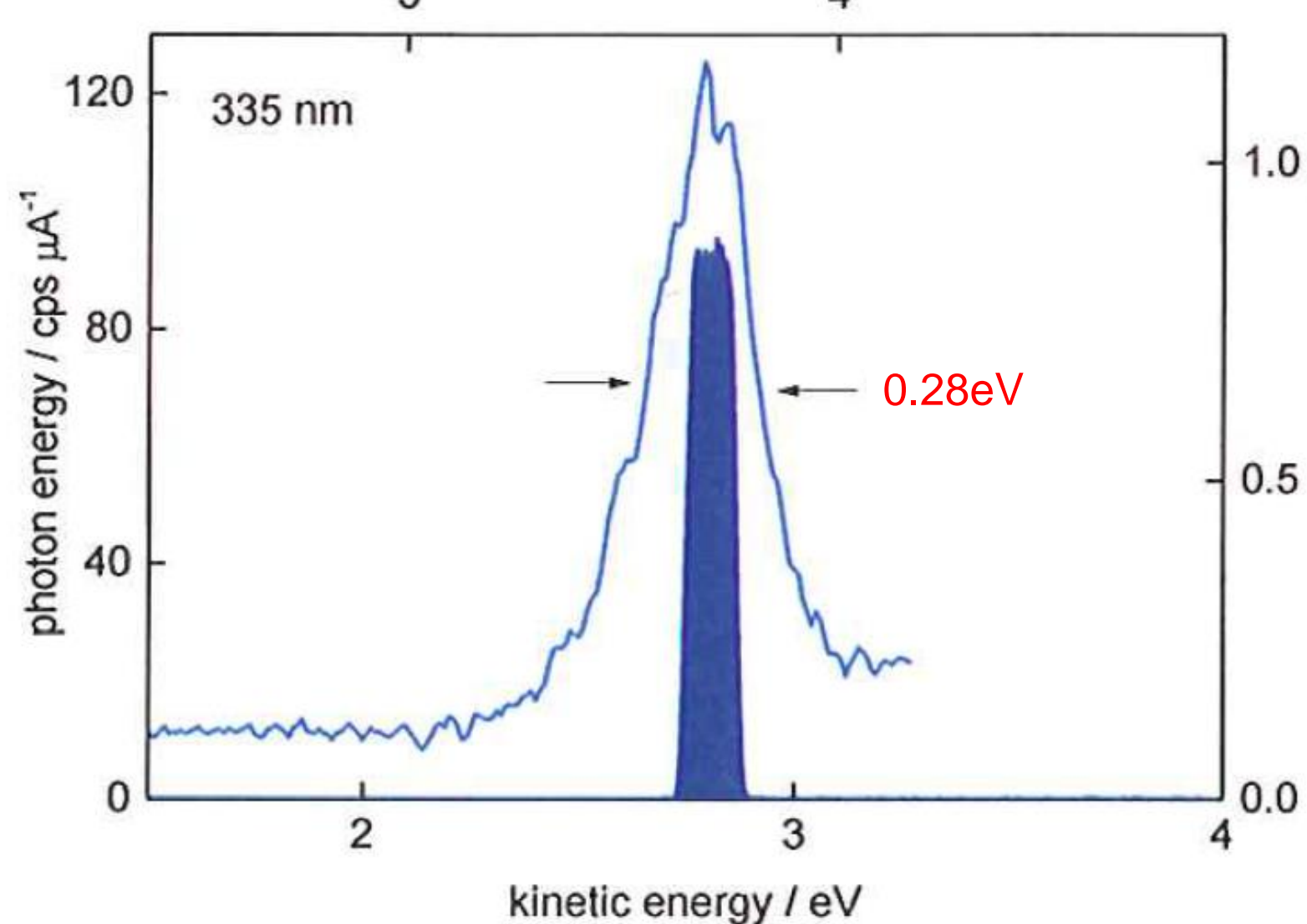


(A): it shows a red arrow rising position in the spectrum of each wavelength.  
(B): a plot of the energy of photon to observe the rising position, Fitting a straight line of slope 1 who is seeking the electron affinity.

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

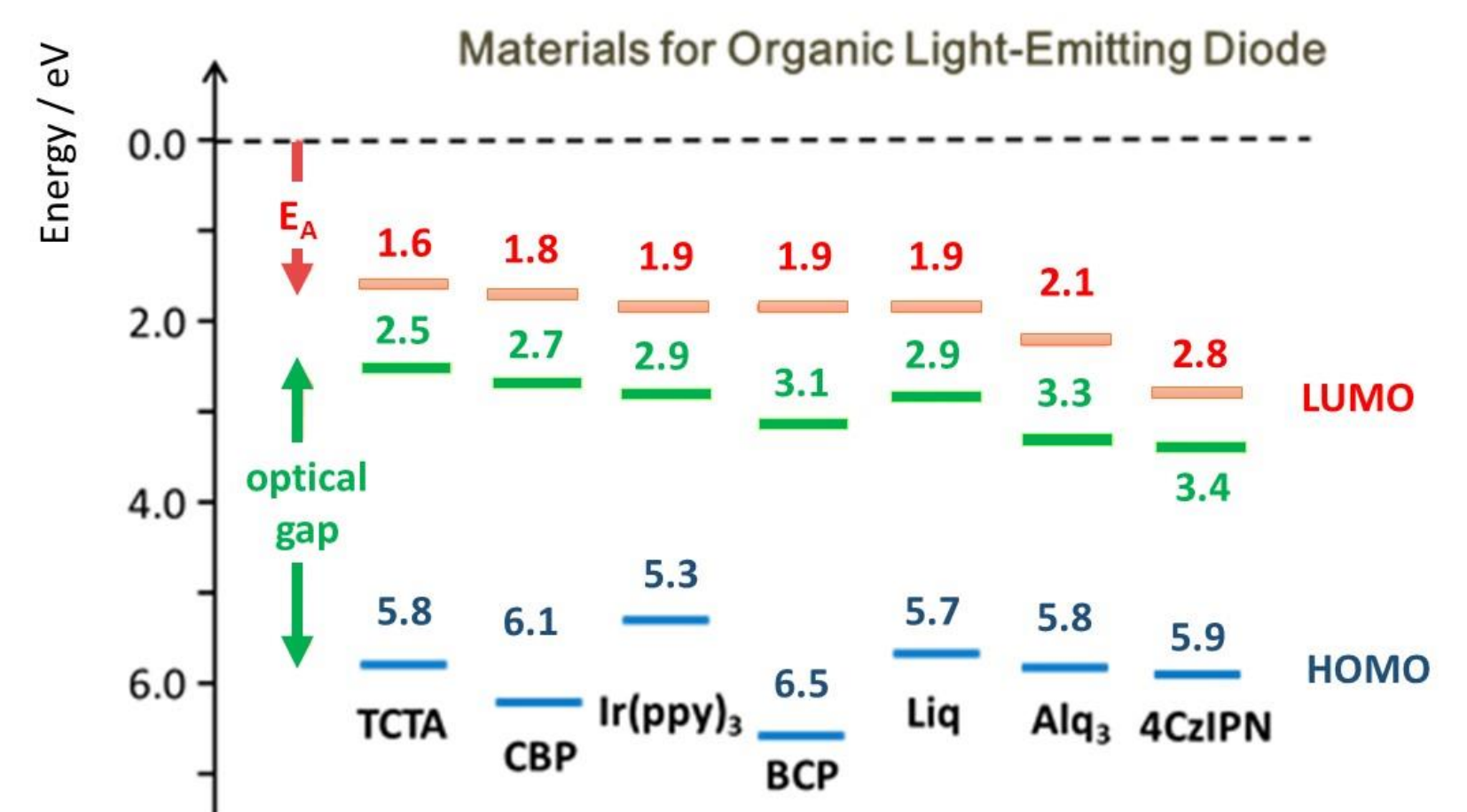
### Resolution of the apparatus

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



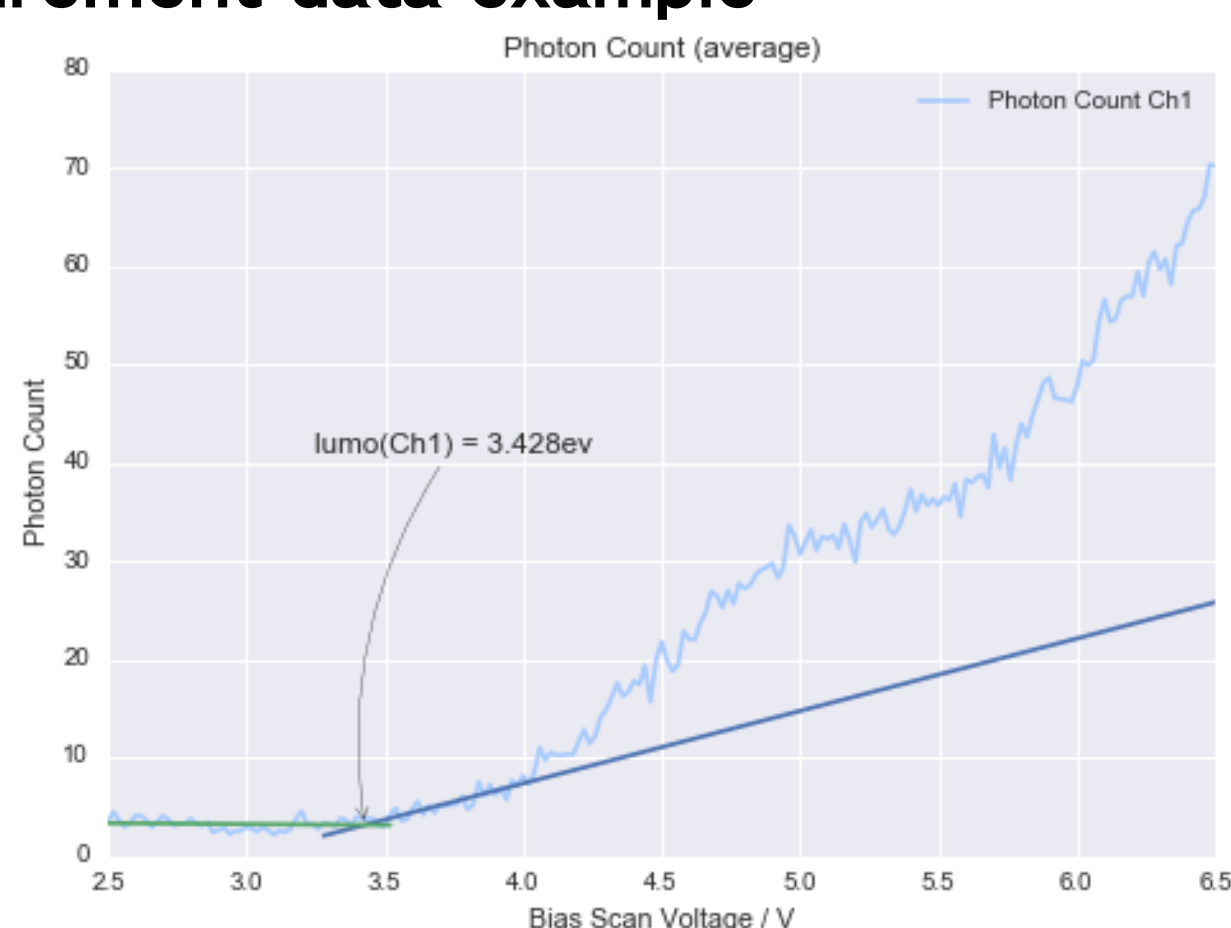
### Electron affinity measurement of the organic EL element

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

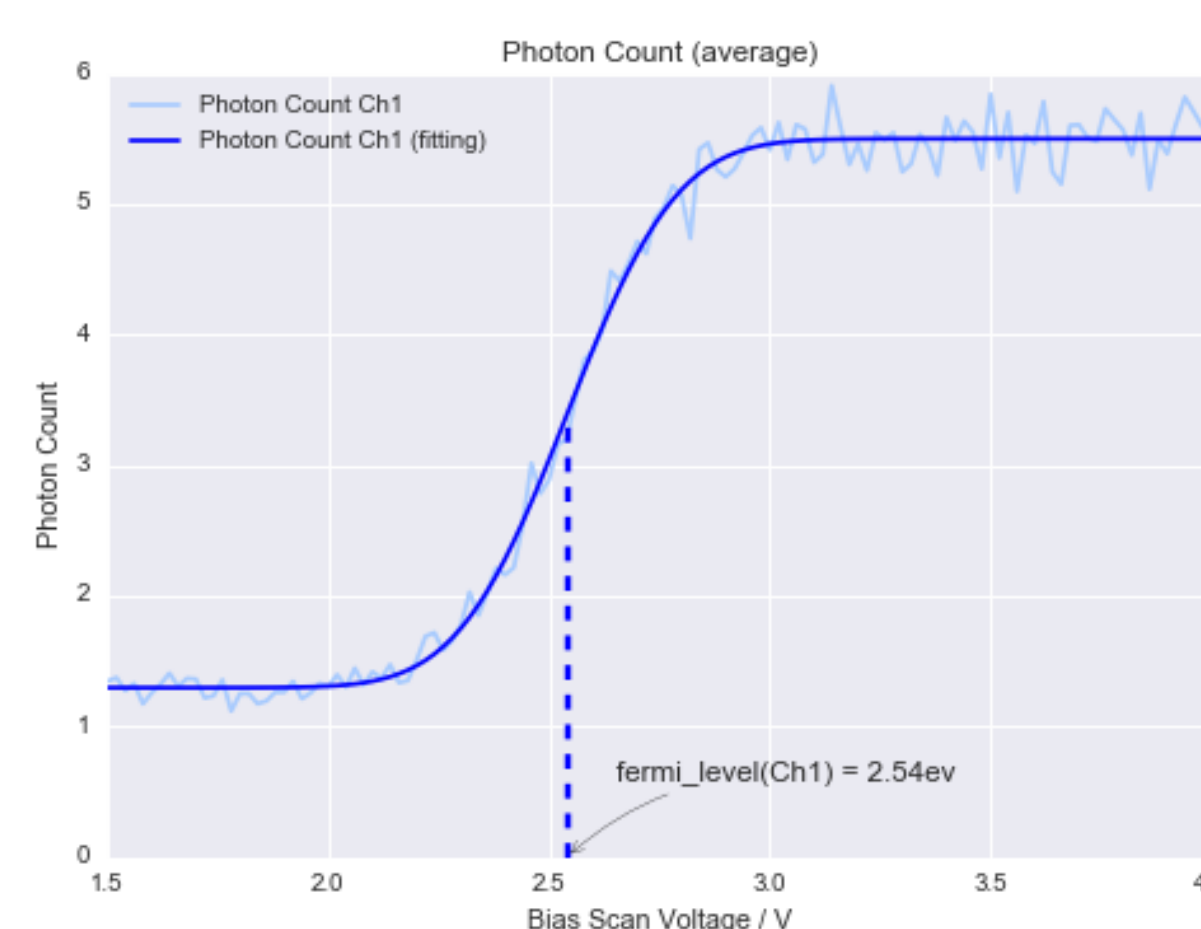


※With respect to the measurement data, it does not guarantee a measure of our apparatus.  
<Reference> H. Yoshida, K. Yoshizaki, "Electron affinities of organic materials used for organic light-emitting diodes: A low-energy inverse photoemission study", *Org. Electron.* 20, 24-30 (2015).

### Measurement data example



Organic semiconductor



Ag

### Detector image

