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Research Article

MEASURING AND COMPARING THE KINETIC ENERGY VS. FREQUENCY AND CURRENT VS. WAVELENGTH CHARACTERISTICS OF DIFFERENT CATHODE MATERIAL IN VIRTUAL PHOTOEMISSION TOOLBUT WITH THE SAME LIGHT INTENSITY

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ABSTRACT
In this paper I am going to present calculation of different parameters value and their graphical representations on the basis of java simulation based photoemission experiment with different cathode material experiment and also explain their results. For this I have been used java technology to develop this application. We will examine this calculation with simulation based method.

Keyword*: Photoemission, Computer Simulations, Java Technology*

INTRODUCTION
Electromagnetic radiation (such as visible or ultraviolet light) of the right frequency shines on the metal. At the time of its discovery, the classical wave model for light predicted that the energy of the emitted electrons would increase as the intensity (brightness) of the light increased. Instead it was discovered that the energy of the emitted electrons was directly proportional to the frequency of the incident light, and that no electrons would be emitted if the light source was not above a certain threshold frequency. Lower energy electrons were emitted when light with relatively low frequency was incident on the metal, and higher energy electrons were emitted when light with relatively high frequency was incident on the metal.
A java simulation based virtual photoemission Apparatus consists of light source enclosure, a power supply for the light source and the test instrument. The apparatus has several important features:
• The photoelectric tube has low levels of dark current and anode reverse current.
• The cathode materials are of high quality in order to avoid an error.
• Different cathode materials are available in one platform.

MATERIALS AND METHODS
A java simulation based virtual photoemission apparatus with a small window over different intensity, wavelength of source and a choice of cathode material was used. By shining a discharge lamp at the window and using the intensity option different light could be obtained. An ammeter was shown in the system for read the current. The power supply for the retarding potential was a dc power supply 0-8 V. I was applied following procedure for recording the different reading-first we opened java simulation based virtual photoemission apparatus and we set simulation to the following setting - Battery 0 V, Intensity to 100%, Wavelength to 100 nm, Target to aluminium we have different material available in option window. We just clicked and recorded different parameter in data chart. We were repeated above steps but targeted to some other metal. We were applied same procedure gathering results until we have the different readings for all of the metals. Finally using graph paper, we constructed a graph that represents the change in kinetic energy as a function of wavelength for each metal, current as a function of wavelength for each metal.

RESULTS AND DISCUSSION
As the frequency of the light source decreased (Figure 1), the kinetic energy (eV) increased and the stopping potential changed the same. Also, the photocurrent decreased (Figure 3) if wavelengths were increased. The first plot below contains the Frequency versus K.E. curves for different target material at fixed value of intensity to 100%. The second contains the wavelength of the light source versus the

photocurrent for different cathode material. The eleven cathode material chosen for this plot are different wavelength and frequency.

The following graph shows the effect of shining different frequencies of light on eleven different metals. From the formula for work function (W = hfo) we know that the higher the work function, the higher the threshold frequency. Therefore, the lines are shown in graph according to their ordered of lower to higher value of work function (Figure 1)

From the graph (Figure 1 and Figure 2), we can even relate the photoemission formula to the formula for a straight line graph if it helps we remember what the three parts of the graph represent.

hf = KE + W

KE = hf – W

y = mx + b

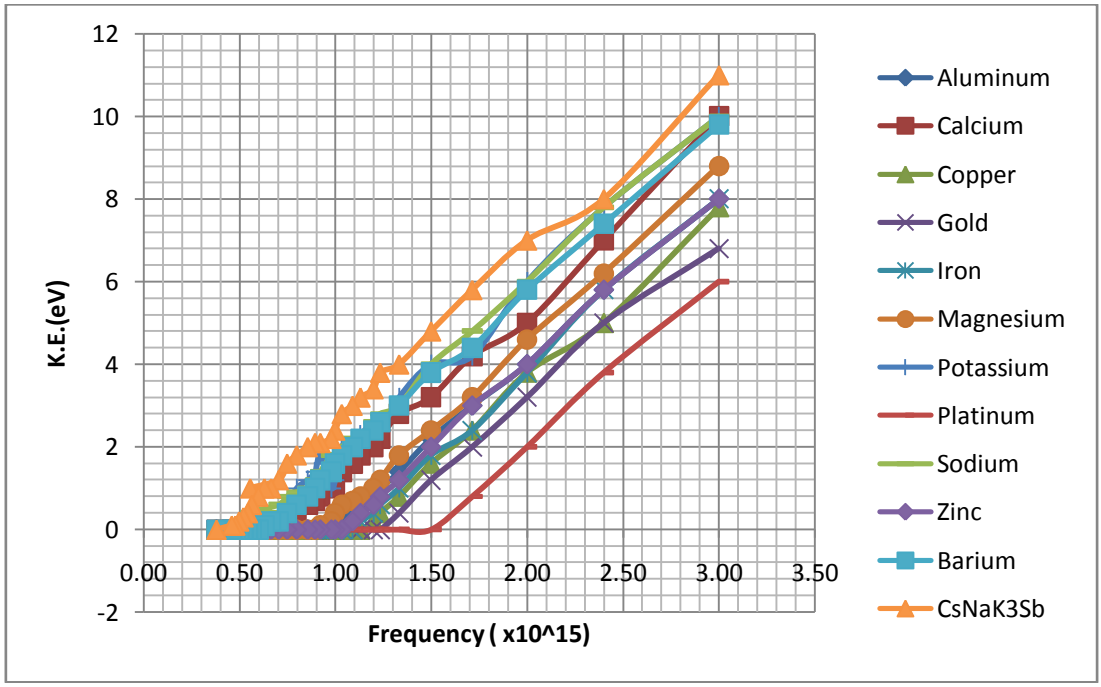

Figure 1: Kinetic energy vs. Frequency

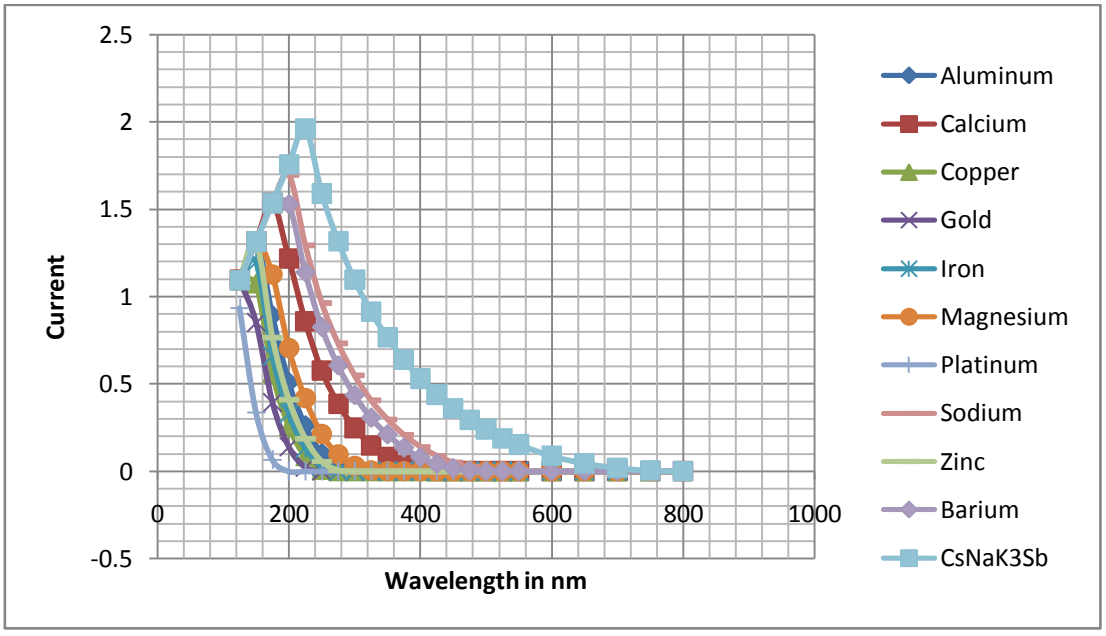

Figure 2: Current vs. Wavelength

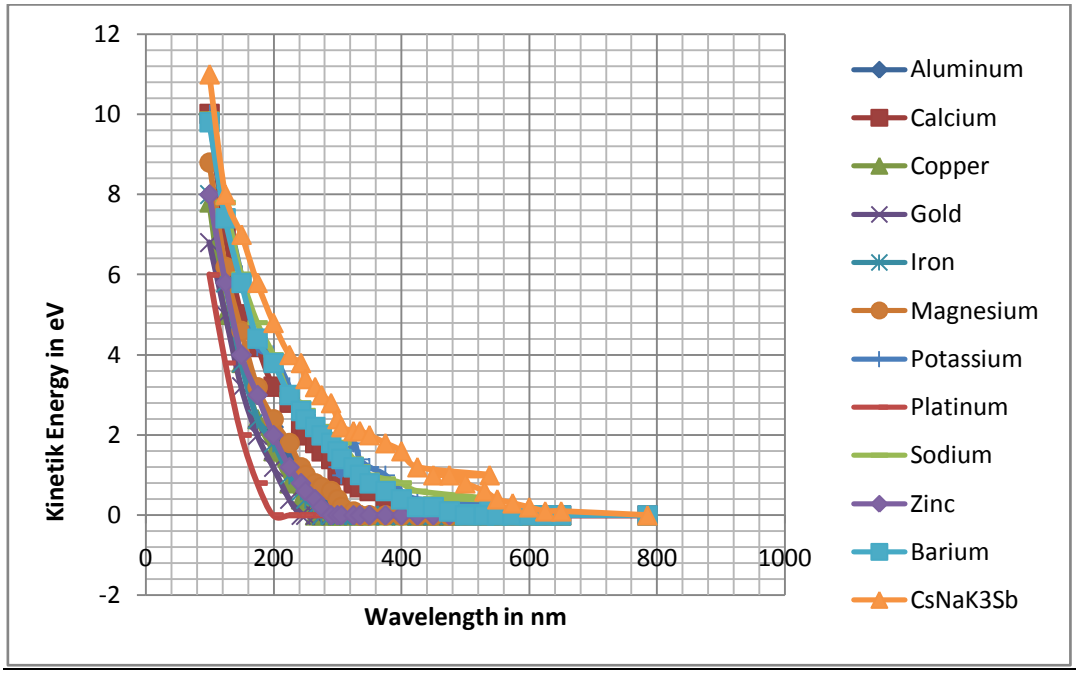

Figure 3: Kinetic energy vs. Wavelength

- The y axis is KE
- The slope (m) is Planck's Constant (h)
- The x axis is the frequency
- The y intercept is the work function (W)

Figure 1 all the target materials kinetic energy value is depends upon the value of frequency and it increases with increase the value of frequency in gradual manners. Figure 2 and Figure 3 for all target materials, no electrons are emitted when the incident light is up to particular colour. When lower wavelength of light strikes the metal, however, the photons have enough energy to create photoelectrons. The photoelectrons have even more kinetic energy (that is, they move faster) when the frequency is increased further to lower and lower wavelength of light.

Conclusion

We have verified the working of virtual photoemission tool of different target material and their calculations. According quantum theory, light is quantized with energy related to the frequency of light and also kinetic energy and frequency are linearly dependant. We show and proved with the help of virtual experimental basis all the assumption of quantum theory is true. All the above graphs are similar to actual data base of each material. Hence the virtual lab is one of the options for actual laboratory experiments.

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