Teachers notes for the Photon Lab

Here are some good links for background information:-

http://www.4physics.com/phy\_demo/glow/glow\_d.htm

use the back button for more basic information.

Also for a definition of terms try:-

https://www.edinst.com/blog/photoluminescence-differences/

There are many "Glow in the dark materials" you can get online - a typical link is:-

https://www.glow.co.uk/1000-glow-in-the-dark-stars.html

Strategy

Try and direct the student first to some tests to prove that the instrument is light tight and showing no readings with no sample. Then still without a sample how can the student determine the size of the delay between turning the LED off. Remember using a longer integration time results in more sensitivity but you can not take as many samples per second.

At first use samples that have been exposed to daylight , with no LED excitation. It might take an hour or so in full sunlight to charge up the material to full brightness. Alternatively if you have a photographic flash gun then you can try super charging them very quickly with this.

Transfer to the sample holder quickly and start the measurements as soon as possible. This gives you the biggest readings.

Try putting sun tan lotion of various factor values on the samples before charging in daylight to see if there is any effect in how long it takes to charge and the peak light output. You can clean it off with soap and water.

Try with LED excitation after the sample has been left in the dark overnight. You will see a very small range of light outputs, quickly dropping to a reading of one or zero at full amplification and integration times.

Try with different materials if you have them, some are more effective than others.

The IR sensor has little contribution to make in these experiments, encourage the student to try all data types and see if the results are different.

Analysis

Look at the data and try and determine the half life of the material you are using, you should be able to measure this at various parts in the curve. They should be the same whether measured in the steep decent or the shallow part. However they will not give exactly the same figure due to the resolution of the readings. This can lead into a discussion of errors in measurements.

Does the half life depend on the type of material use? Is it a useful way of determining if two products are of the same material?

Any decay measurements depend on the temperature being constant. See if a hot or cold day effects the results from the samples. Do the sample's half life change over time?