

Light is one form of energy but there are many others.

Batteries contain chemical energy, which they convert to electrical energy.

Find the LED/battery assembly instructions to put together your UV LED setup

Even though your UV LED will look purple, most of the light it emits is invisible!

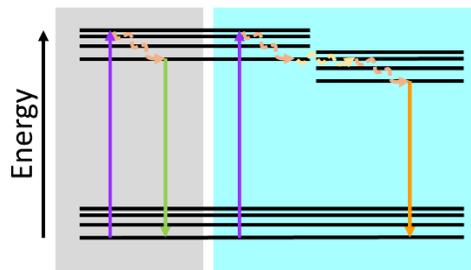
Use the UV LED to look at things in your kit and around your house – try turning the room lights off!

Find the turmeric demo instructions and follow them!

Fluorescence = emission of light that is a lower energy than absorbed light

Excitation = when an object absorbs light and temporarily stores the energy

The turmeric fluoresces by being excited by UV light and emitting yellow light.



The arrows and the left show fluorescence, and on the right show phosphorescence.

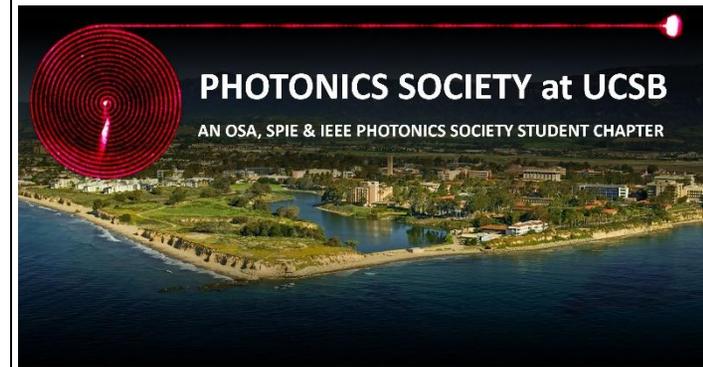
The mission of the Photonics Society at UCSB is to develop a local and regional network of student and professionals for the purposes of engaging community through photonics education and providing opportunities for career development.

Words to Learn

Photonics
Photon
LED
Ultraviolet (UV)
Fluorescence
Excitation
Phosphorescence
Reflection

Think-about-it questions

- What does the prefix “photo-“ mean? Where have you heard it?
- What types of energy does your UV LED use? Write what is converted.
- Why is UV light sometimes called “blacklight”?
- Which color is higher energy, blue or yellow? What about green or violet?
- Are glow-in-the-dark things fluorescent or phosphorescent?
- Put these liquids in order of density (weight per volume): oil, water, isopropyl alcohol.



Photonics at home:

FLUORESCENCE



Questions? president@ips.ece.ucsb.edu

Photonics = the study of light and devices that make and use light

Photon = a unit or particle of light

The Big Ideas

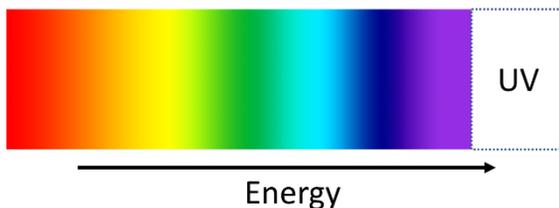
- Light is a form of energy – different colors are different energies
- Fluorescence is a process involving light ‘creation’ and it’s everywhere!
- Ultraviolet light is a high energy ‘color’ of light that we cannot see

READ ALL SAFETY INSTRUCTIONS NOW

LED = acronym for Light Emitting Diode

Ultraviolet (UV) = invisible light that is higher energy than humans can see

The electromagnetic spectrum contains all the types of light, including the entire rainbow and light we cannot see!



Red is the lowest energy light we can see, violet is the highest energy light we can see, and ultraviolet (UV) is higher than violet.

Sometimes, things glow over time rather than emitting light all at once.

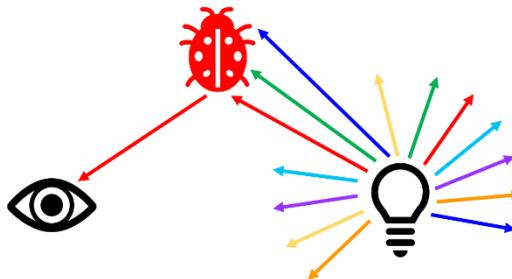
When the room lights are off, look to see what glows with and without UV light.

Phosphorescence = like fluorescence, but the emission happens over time

Reflection = when the same photon of light hits an object and bounces off

When the room lights are on, they emit white light, which is really a combination of all the other colors of visible light.

We see most things when photons reflect or bounce off things and into your eyes.



Things are different colors when some photons are absorbed instead of reflected.

In fluorescence or phosphorescence, the absorbed photons create new, lower energy photons, which are emitted.

Find the lava lamp assembly instructions and get started! Read them carefully!

Turn off the room lights and bring the UV LED close to your lava lamp.

You can change where the oil bubbles float by taking liquid out and adding more water or isopropyl alcohol.

Hint: More water makes the oil float.

Find the glow paint instructions and mix your paint up – it’s more than you think

Grab your paintbrush, something that’s okay to paint on, and get creative!

Turn off the room lights to test the painting. You can also ‘charge’ it with the UV LED



Keep exploring with your UV LED to find more things that fluoresce! White paper, vegetables, plants, teeth, and laundry detergent are great places to start!

Extra: Collect the items you need and try some make your own invisible ink

Feel free to reach out to us if you have questions, want more resources, or want to let us know what you think!