Conceptual Physics Lab 08s: **Light Emitting Diodes – Part I**

**Problem:** How does an LED work?

**Pre-lab:**

1. What does LED stand for?
2. What does emission mean? How does emission differ from absorption?
3. Read through the procedure carefully, and design an appropriate data table to hold the data you will gather in this LED experiment.

**Materials:** power source, digital multimeter, resistors, LED (red, yellow, orange, green), wires with alligator clips

**Procedure:**

You will test each of the following LED’s by inserting them into a circuit with a DC power source, as illustrated below.

Resistor

LED

+

-

**Power Source**



1. Connect the first LED to the setup shown above. Set the output amperage as instructed. **Slowly** increase the voltage on the DC power source until the LED lights up. Record the minimum voltage needed to light the LED, as well as the color of the LED and any other observations. **[WARNING: Do NOT let the voltage reading on the digital multimeter exceed 5 V!]**
2. Using a spectroscope, determine the wavelength of light emitted by the LED.
3. Repeat the experiment for each of the available LEDs.
4. Disassemble your equipment and clean up, ensuring that you return the LED’s to their proper container.

**Data:**

[Insert your data table here]

**Class Discussion:**

With your lab partner, brainstorm a list of things (or come up with a list of further questions) you feel that you need to understand in order to answer the problem.

**Summing Up:**

1. At first glance, all of the LED’s look the same. Describe the similarities and differences between the LEDs based upon your experimental data.
2. Look carefully at the voltage needed to “turn-on” each of the LEDs. What is the relationship between wavelength and turn-on voltage? Why is this?
3. What does it mean to be “nanoscale”? How large is the LED that you used in class (while the answer to this question varies a bit, most standard sized LEDs have similar sizes which you should be able to determine.)
4. **[Critical Thinking]** LEDs will only light up when connected to the proper polarity (either + or -). What does this imply about the function of LED devices? (Feel free to research this!)