Measurement Sheet

Lab #3: ZnS:Cu LED

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Experiment #1: ZnS:Cu LED

Please follow the instruction to make your own ZnS:Cu LED.

1) What is ITO? What do we use it for?

2) Why is ITO transparent in the visible light range? Is it transparent in the ultraviolet also?

3) Why do we need a curing agent for epoxy resin?

4) How to change the emission color of ZnS:Cu phosphor?

Experiment #2: Electroluminescence

Please connect the ZnS:Cu LED with the AC-DC inverter powered by 3 AA batteries. The output voltage from the inverter is 650 Vac at 80 kHz.

1) What is the electrical field (V/m) applied across the pixel?

2) Use your homemade spectrometer to characterize the wavelength (nm) and record it.

Experiment #3: Photoluminescence

Please expose the ZnS:Cu LED to UV light and observe the emission.

1) Why do we use UV light? Can we use other light sources? For example?

2) Is the color different from what you saw previously? Why?

Follow-up Questions:

- What are the advantages and disadvantages of quantum dot LEDs over traditional LEDs?

- What are other LED-based technologies besides lighting? List three applications.

- What color of light would you see if you have a blue diode with yellow phosphor?

- How does LED performance change with temperature?

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Problem 42.31 from Young, Hugh D., Roger A. Freeman, and A. Lewis Ford. *University Physics with Modern Physics*. 13th ed. Addison-Wesley, 2011. ISBN: 9780321696861.

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