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Quantum Efficiency in Perovskite Light Emitting Diodes under Low to High Current Densities

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Quantum Efficiency in Perovskite Light Emitting Diodes under Low to High Current Densities

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Introduction

- Light emitting diodes (LEDs), have attracted much attention in research and industry thanks to their versatility and efficiency
- Unfortunately every LED is limited by their efficiency as they reach higher levels of brightness (roll off)
- Exploring the Perovskite’s External quantum efficiencies (EQE’s) are imperative to uncover the fundamental causes of efficiency roll-off in these devices

Steady State Measurements

- Quantum efficiency is an important characteristic for any photovoltaic/LED device.
- Allows us to determine the ratio of the number of photons emitted from the LED to the number of electrons passing through the device
  \[ \text{EQE} = \frac{\text{photons out}}{\text{electrons in}} \times \frac{\text{electrons/s}}{I} = \frac{\Phi}{I} \]

Motivation

- Devices with varying composition

Pulsed Measurements

- Perovskite LEDs are still in their infancy due to reoccurring instabilities and their high level of sensitivity. Unfortunately, leading us to be discontent with our results. The efficiency of the perovskite is still not better than a conventional LED, but it is still an area to be studied.
- There are many advantages that present it as a promising material. Common advantages of the Perovskite LED is low cost synthesis. Perovskites are easily created from a solution to further explore other areas.

Conclusion

Advantages

- Sensors
- Solar Cells
- Optoelectronics
- Lasers
- Light Emission
- High Color Purity
- Tunable Bandgap
- Efficient
- Low Cost
- Semi-Conducting

Applications

- Sensors
- Solar Cells
- Optoelectronics
- Lasers
- Light Emission

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