ORGANIC LIGHT EMITTING DIODES

Project Code: HK1a-04

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An organic light emitting diode (OLED) has a multi-layered structure in which the organic materials are sandwiched between two electrodes. There are two organic layers with different charge carriers transporting properties. The interface between these two layers provides a region for the recombination of the injected hole-electron pair and produces light.

The aim of the project was to develop a computer program which simulated the optical efficiency performance of OLEDs based on an optical model.

**Project Overview**

The aim of the project was to develop a computer program which simulated the optical efficiency performance of OLEDs based on an optical model.

**Input Parameters**
- OLED structure
- Thickness of layer
- Refractive index of material
- Emission properties
  - Dipole Position
  - EL spectrum

**Results (Graphs)**
- Angular distribution vs thickness of layer
- Integrated power vs thickness of layer
- Normal direction vs thickness of layer
- Output spectrum vs viewing angles
- Output Color in CIE 1931 chromaticity diagram
Display information about the structure

Select the graphs to be plotted

Display the structure of the OLED

Control buttons for the layers

Add layer to the device

Select the OLED structure: top / bottom emitting
The graph on the left shows the variation of angular distribution with layer thickness for bottom-emitting OLED. As indicated by the graph, the output is highest when observed at normal direction. Among different thicknesses of Alq layer, the output of the OLED is highest when the thickness equals 70nm.

The graph showing the output spectrum with different viewing angles for bottom-emitting OLED is illustrated on the right. As the viewing angle decreases, the peak of the wavelength of the output spectrum gradually decreases.

The graph on the left shows the variation of total integrated power with layer thickness for top-emitting OLED. The maximum integrated power is resulted when 60nm Alq layer is used.