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Transparent Electroluminescent Devices with Controlled One-Side Emissive Displays

Organic light emitting devices (OLEDs) are a new generation of display technology. OLEDs with polarized light are optimal for mobile displays or other full color display applications. To enable a high quality of full color displays, a polarizer may be paired with a transparent electrode of an OLED. This filters unwanted reflected light from the background and yields linearly or circularly polarized light. However, this polarizer/OLED arrangement decreases the device efficiency of the OLED by filtering some of the emitted photons. Therefore, there is a need for transparent and efficient OLED display technology.

Researchers at Arizona State University have invented transparent OLEDs with controlled one-side emissive displays. The emissive light from one side of the OLED can be eliminated without reducing the natural background light from the back. This is done by positioning polarizers to filter the circularly polarized light from OLEDs. Thus, the majority of the light is emitted from only one side of the overall device. These transparent and efficient OLEDs are possible through the incorporation of optically pure chiral metal complexes. These chiral molecules reduce the need for optical elements, thus enhancing efficiency and creating brighter display elements.

Potential Applications

- Smart devices
- Electronic devices
- Flexible displays
- Lighting

Benefits and Advantages

- Enhanced Efficiency – Chiral molecules eliminate potential photon loss.
- Reduced Complexity – The combination of materials simplifies the components required.
- Brighter Displays - Alignment of chiral complex emitters enhance the out-coupling efficiency of the device (i.e. more photons exit the device to produce higher illumination intensity).

For more information about the inventor(s) and their research, please see

Dr. Jian Li's directory webpage