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AC-Based Characterization of Quantum-Dot Light-Emitting Diodes

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Quantum-dot materials have introduced novel applications in organic light-emitting diodes and solar cells. The size controllability and structure modifications have continuously been upgrading the applicability to optoelectronic and flat-panel displays. In particular, quantum-dot organic light-emitting diodes (QLEDs) are a device driven through the electrical field applied to the electrical diodes. The QLEDs are affected by the constituent materials and the corresponding device structures. Conventionally, the electrical properties are characterized only in terms of dc-based current-voltage characteristics. The dynamic change in light-emitting diodes should be characterized in emitted and non-emitted states. Therefore, the frequency-dependent impedance can offer different information on the electrical performance in QLED. The current work reports an auxiliary information on the electrical and optical features originating from quantum-dot organic light-emitting diodes. The empirical characterizations are discussed towards an experimental tool in optimizing the light-emitting diodes.

Keywords: QLEDs, Quantum-dot light-emitting diodes, Ac-based characterization, Impedance