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Controlling Emission Zone in Blue OLEDs by Material Design
ASANGA PADMAPERUMA, EVGUENI POLIKARPOV, JAMES SWENSEN, LELIA COSIMBESCU, PHILLIP KOECH, LIANG WANG, Pacific Northwest National Laboratory — The blue component is one of the remaining challenges for the organic light emitting devices (OLED) based solid-state lighting technology. OLEDs have the potential to generate solid state white lighting with 50% power conversion efficiency. However realizing this potential will require optimization of not only blue emitter dopants but also host matrices. Charge balance is a key factor in achieving high quantum efficiency and low operating voltage in OLED devices. In this work, we studied the effect of the chemical structure of the phosphine oxide-based hosts and electron transport materials on the location of the emission zone. We observed that a strong domination of one carrier within the host results in highly localized emission zones in OLEDs. As a result, an alteration of the chemical design of the materials allows for the control of the emissive region location within the EML. By chemical modification of the host molecule, we achieved a relocation of the emissive zone in blue OLEDs from the EML/ETL interface to the EML/HTL interface.

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