Abstract Submitted
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Characterization of phosphorescent organic light-emitting diodes using current noise cross-correlated spectroscopy THADDEE KAMDEM DJIDJOU, University of Utah, Department of Physics & Astronomy, Utah, SERGEY LI, Plextronics Inc., Pittsburgh, Pennsylvania, ANDREY ROGACHEV, University of Utah, Department of Physics & Astronomy, Utah — Carrier injection and transport mechanism in small-molecule phosphorescent organic light-emitting diodes (PhOLED) have been investigated using current noise spectroscopy. The PhOLED devices studied consist of multilayers having the structure ITO / NPB / NPB:Irphq / Balq / Bpen:$CsCO_3$/ Al. We found that in high bias regime, the noise spectral density can be described by two terms, $1/ f^{1.3}$ and $1/f^{2.8}$. The first term disappears below 2.5 V, as does the luminance; this suggests that this term is related to bimolecular recombination in the devices. The second term is more pronounced al low frequencies and its magnitude is linearly proportional to the current in the device. This term, which exists in all bias range, is likely related to the presence of traps with a distributed time constant. For applied voltages greater than 2.4 V, the frequency-independent noise is dominated by the shot noise. The Fano factor is one in the range 2.4 - 2.5 V, and decreases to a constant value of 0.4 at higher biases. This indicates the presence of a barrier for carrier injection into the device. Our overall results confirm the utility of noise measurements for OLED characterization.

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