



发光学应用及交叉前沿

基于a-IGZO TFT的AMOLED像素电路稳定性的仿真研究

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摘要：非晶铟镓锌氧化物薄膜晶体管(a-IGZO TFT)有望在有源矩阵有机发光显示(AMOLED)像素电路中得到实际应用,但其电压偏置效应仍会引起电路特性的不稳定。本文利用实验室制备的a-IGZO TFT器件进行参数提取并建立了SPICE仿真模型,通过拟合得到了它的阈值电压随时间变化的方程。在此基础上,采用SPICE软件对基于a-IGZO TFT的2T1C和3T1C两种AMOLED 像素电路的稳定性进行了比较研究,证明3T1C电路对阈值电压偏移确实存在一定的补偿效果。最后讨论了进一步改善AMOLED像素电路稳定特性的方法和实际效果。

关键词：非晶铟镓锌氧化物 AMOLED 薄膜晶体管 像素电路

Simulation of The Stability of a-IGZO TFT-OLED Pixel Circuits

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Abstract: Amorphous In-Ga-Zn-O thin film transistors (a-IGZO TFTs) have potentials to be used in pixel circuits of active matrix organic light emitting display (AMOLED). However, bias stress effect still involves a-IGZO TFTs, evidently influencing performance of the corresponding AMOLED pixel circuits. In this study, inverted-staggered a-IGZO TFT devices were fabricated and measured, following which the corresponding Spice model was created. In addition, the dependence of stress time on threshold voltage (V_{th}) shift was theoretically modeled. By using SPICE simulation tool, we studied the stability properties of a-IGZO TFT-OLED pixel circuits in the forms of 2T1C and 3T1C, which proves there exists somewhat compensation effect on the V_{th} shift in 3T1C pixel circuit. Finally, we discussed and analyzed the way to further improve stability of a-IGZO TFT-OLED pixel circuits.

Keywords: a-IGZO AMOLED TFT pixel circuit

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