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Transparent Carbon Nanotube layers as cathodes in OLEDs

ALEXIOS PAPADIMITRATOS, ALBERT NASIBULIN, ESKO KAUPPINEN, ANVAR ZAKHIDOV, SOLARNO INC COLLABORATION, AALTO UNIVERSITY COLLABORATION, UT DALLAS COLLABORATION — Organic Light Emitting diodes (OLEDs) have attracted high interest in recent years due to their potential use in future lighting and display applications. Reported work on OLEDs traditionally utilizes low work function materials as cathodes that are expensive to fabricate because of the high vacuum processing. Transparent carbon nanotube (CNT) sheets have excellent mechanical and electrical properties. We have already shown earlier that multi-wall (MWCNT) as well as single CNT (SWCNT) sheets can be used as effective anodes in bright OLEDs [1,2]. The true advantage of using the CNT sheets lies in flexible devices and new architectures with CNT sheet as layers in tandem devices [3] with parallel connection. In this work, we are investigating the possibility of using SWCNT as cathodes in OLEDs. SWCNT sheets have been reported to show lower work function compared to MWCNT. Our work attempts to demonstrate transparent OLED devices with CNT anodes and cathodes. In the process, OLEDs with CNT cathodes have been fabricated in normal and inverted configurations using inorganic oxides (MoO₃, ZnO) as inversion layers.[1] C.D. Williams et al., Appl.Phys.Lett. 93, 1, 2008.[2] A. Kaskela et al. Nano Lett., 10,11, 4349 ,2010.[3] A. Papadimitratos et al. 8th ICEL,2010.

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