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The effect of metal-buffer bilayer Drain/Source electrodes on the operational stability of the organic field effect transistors

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In this paper, we have investigated experimentally the effect of different drain/source (D/S) electrodes and charge injection buffer layers on the electrical properties and operational stability of a stilbene organic field effect transistor (OFET). The results show that the organic buffer layer of Copper phthalocyanine (CuPc) considerably improves the electrical properties of the transistors, but has a negligible effect on their temporal behavior. On the other hand, inorganic metal-oxide buffer layer of Molybdenum oxide (MoO_3) drastically changes both the electrical properties and operational stability. The functionalities of this metal-oxide tightly depend on the properties of the D/S metallic electrodes. OFETs with Al/MoO_3 as the bilayer D/S electrodes have the best electrical properties: field effect mobility μ_{eff}=0.32 cm^2/V.s and threshold voltage V_{TH}=-5 V and the transistors with Ag/MoO_3 have the longest operational stability. It was concluded that the chemical stability of the metal/metal-oxide or metal/organic interfaces of the bilayer D/S electrodes determine the operational stability of the OFETs.

Keywords: Organic transistors, Operational stability, buffer layers.