

The study focuses on the dependence of the transient electroluminescence lifetime in OLEDs on the active layer architecture and injection efficiency during turn-off. For this purpose, a self-developed driver was used, facilitating a switching time of $\sim 5\text{ns}$ and minimal effect on the steady-state charge distribution. We found that for blend active layer structure increasing the thickness of the active layer results in a longer transient lifetime. This relates to the radiative recombination of newly formed singlet excitons formed by the discharge of the space charge regions at the electrodes. For bi-layer OLED however, we found that increasing the HTL layer thickness leads to shorter transient time. This decrease in transient lifetime relates to a decrease in the electric field on the ETL, resulting from lower charge carrier density on the internal interface. In regard to the injection efficiency, we found that increasing the efficiency leads to shorter transient lifetime. The decrease in injection barrier results in higher charge carrier density on the internal interface, leading to higher electric field and shorter decay time. The experimental results are supported by simulation based on the Marburg model.