

Influence of UV/Ozone Treatment on the Electrical Performance of Polystyrene Buffered Pentacene-Based OFETs

Authors : Lin Gong, Holger Göbel

Abstract : In the present study, we have investigated the influence of UV/ozone treatment on pentacene-based organic field effect transistors (OFETs) with a bilayer gate dielectric. The OFETs for this study were fabricated on heavily n-doped Si substrates with a thermally deposited SiO₂ dielectric layer (300nm). On the SiO₂ dielectric a very thin (≈ 15 nm) buffer layer of polystyrene (PS) was first spin-coated and then treated by UV/ozone to modify the surface prior to the deposition of pentacene. We found out that by extending the UV/ozone treatment time the threshold voltage of the OFETs was monotonically shifted towards positive values, whereas the field effect mobility first decreased but eventually reached a stable value after a treatment time of approximately thirty seconds. Since the field effect mobility of the UV/ozone treated bilayer OFETs was found to be higher than the value of a comparable transistor with a single layer dielectric, we propose that the bilayer (SiO₂/PS) structure can be used to shift the threshold voltage to a desired value without sacrificing field effect mobility.

Keywords : buffer layer, organic field effect transistors, threshold voltage, UV/ozone treatment

Conference Title : ICOE 2016 : International Conference on Organic Electronics

Conference Location : Singapore, Singapore

Conference Dates : March 03-04, 2016