Paper Transistors with Organic Ferroelectric P(VDF-TrFE) Films

Min Gee Kim[1], and Byung Eun Park[1, *]
[1]School of Electrical and Computer Engineering, University of Seoul, Seoul, 02504
*Byung Eun Park: pbe@uos.ac.kr

Nowadays, organic transistors are taking spotlight because of their advantages including low-cost fabrication, light-weight, and most of all, flexibility. Among flexible substrates, paper can be used to fabricate disposable, eco-friend transistor.

In this experiment, we exhibit electrical characteristics of a nonvolatile transistor fabricated on cellulose paper using a solution-based organic ferroelectric gate insulator and organic semiconductor. With poly(vinylidene-trifluoroethylene) (P(VDF-TrFE)) gate insulator, the transistor exhibit nonvolatile characteristics without external electric field. P(VDF-TrFE) and organic semiconductor layer are commonly spin-coated and annealed to crystalize. This method can be used on the paper substrate. Although there is no further step to protect substrate from wetting the substrate, it shows desirable characteristics of transistors.
Also, we found relation between thickness of the gate insulator and performance of the paper transistor. Generally, capacitance of gate insulator determine electrical performance. However, we have to consider polarization value and coercive voltage of the organic ferroelectric material in ferroelectric-gate transistors. Threshold voltage and on/off current is affected by coercive voltage and polarization value, respectively. We could control the thickness of P(VDF-TrFE) gate insulator by changing concentration of P(VDF-TrFE) solution.