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Enhanced performance of ferroelectric-based all organic transistors and capacitors through choice of solvent[1] GRANT KNOTTS, University of Missouri-Columbia, ANAGH BHAUMIK, KARTIK GHOSH, Missouri State University, SUCHISMITA GUHA, University of Missouri-Columbia — We examine the role of solvents in the performance of pentacene devices using the ferroelectric copolymer poly(vinylidene fluoride-co-trifluoroethylene) (PVDF-TrFe) as a gate insulating layer. High dipole moment solvents such as dimethyl sulfoxide used to dissolve the copolymer for spin casting increase the charge carrier mobility in field-effect transistors by nearly an order of magnitude as compared to lower dipole moment solvents. The polarization in Al/PVDF-TrFe/Au metal-ferroelectric-metal devices is also investigated. An increase in remnant polarization of $\sim 20\%$ is observed in the sample using dimethyl sulfoxide as the ferroelectric solvent. Interestingly, at low applied electric fields of $\sim$ 100 MV/m a remnant polarization is seen in the high dipole moment device that is nearly 3.5 times larger than the value observed in the lower dipole moment samples, suggesting that the degree of dipolar order is higher at low operating voltages for the high dipole moment device. Detailed analysis of the capacitance characteristics of metal-insulator-semiconductor structure is performed. The density of interface trap states is nearly an order of magnitude lower for the high dipole moment device.

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