

Enhancement of Organic Magnetic Field Effects on Pentacene Thin Film by Covering with Aluminum

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Magnetic field effects observed in various organic devices, abbreviated as OME, are of great scientific interest because of their large magnetoresistance (MR) up to 10% at room temperature and under small magnetic fields of approximately 10 mT without ferromagnetic contacts [1]. In this work, we studied the bottom contact field effect transistor (FET) based on pentacene, which was reported to have negligible OME without light irradiation [2]. However, when a thin layer of Al (2-3 nm) is deposited on top of the pentacene thin film, the OME is enhanced up to MR= 0.4%. This effect may derive from the traps states generated by the Al layer. This result reveals that the interface between the organic layer and Al layer, as usually seen in diode structure, significantly contributes to the OME.

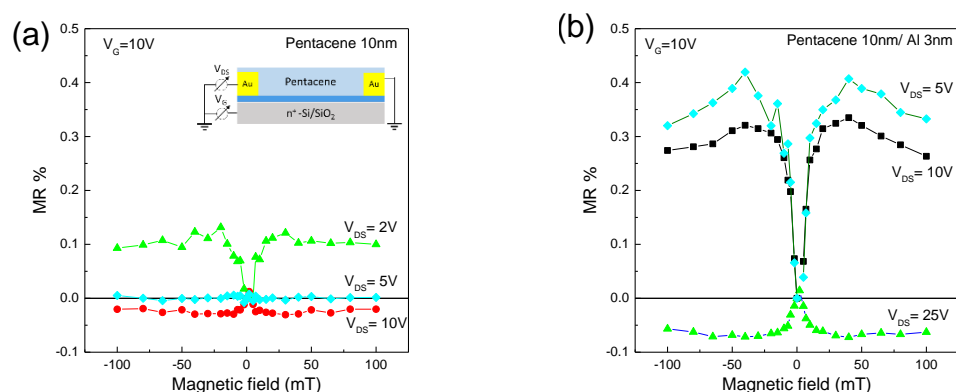


Figure 1: (a) OME of a pentacene field-effect transistor device, inset is the schematic illustration of the device structure, (b) enhancement of OME with 3nm of Al layer deposit on top of pentacene FET.

References:

- [1] T. L. Francis, Ö. Mermer, G. Veeraraghavan, and M. Wohlgenannt, New Journal of Physics 6, 185-185 (2004).
- [2] T. Reichert and T.P.I. Saragi, Appl. Phys. Lett. 98, 63307 (2011).