MS13-2-13 Tuning molecular crystallinity of vanadyl phthalocyanine (VOpc) layers for organic field effect transistors
#MS13-2-13

B.A. Paez-Sierra [1]
[1]Physics Department, Universidad Militar Nueva Granada, Campus Mueva Granada - Granada (Colombia)

Abstract
The effect of static magnetic fields on the molecular growth of vanadyl phthalocyanine (VOpc) layers was investigated. In order to probe device performance, organic field-effect transistors (OFETs) with bottom drain and source electrode configuration was carried out. OFET channels are formed with the organic semiconductor VOPc thin films with about 100 nm thickness. Organic molecules were grown under magnetic fields either parallel or perpendicular to the plane of the electrodes. The computed field-effect mobility was determined to be 2.40 cm2 V-1 s-1, 1.25 cm2 V-1 s-1, and 0.67 cm2 V-1 s-1 for VOpc layers under magnetic field parallel, perpendicular, and no field, respectively. Molecular orientation and crystallographic properties were investigated by polarized Raman spectroscopy measurements. The vibrational spectra reveal that for device production under a parallel magnetic field, VOpc molecules grow in the so-called face-to-face arrangement with the pc plane parallel to the substrate. VOpc layers grown under a magnetic field perpendicular to the substrate are face-to-face ordered with the pc plane tilted with respect to the source and drain plane. In the case of VOpc layers grown in absence of magnetic fields, molecules are face-to-face arranged with the pc plane parallel to the drain or source electrodes and tilted on the OFET channel.

Acknowledgments
This work was supported from funding provided by Vice-Rector for Research – Universidad Militar Nueva Granada, Campus Nueva Granada, grant number IMP-CIAS 3115.

References
Wang, Z., Lin, H., Zhang, X., Li, J., Chen, X., Wang, S., Gong, W., Yan, H., Zhao, Q., Lv, W., Gong, X., Xiao, Q., Li, F., Ji, D., Zhang, X., Dong, H., Li, L., & Hu, W. (2021). Revealing molecular conformation-induced stress at embedded interfaces of organic optoelectronic devices by sum frequency generation spectroscopy. Science advances, 7(16), eabf8555. https://doi.org/10.1126/sciadv.abf8555.