

Suppression of the morphology mismatch in Graphene/ n-type Organic Semiconductor interfaces: a Scanning Kelvin Probe Force Microscopy investigation

Supplementary Material Section

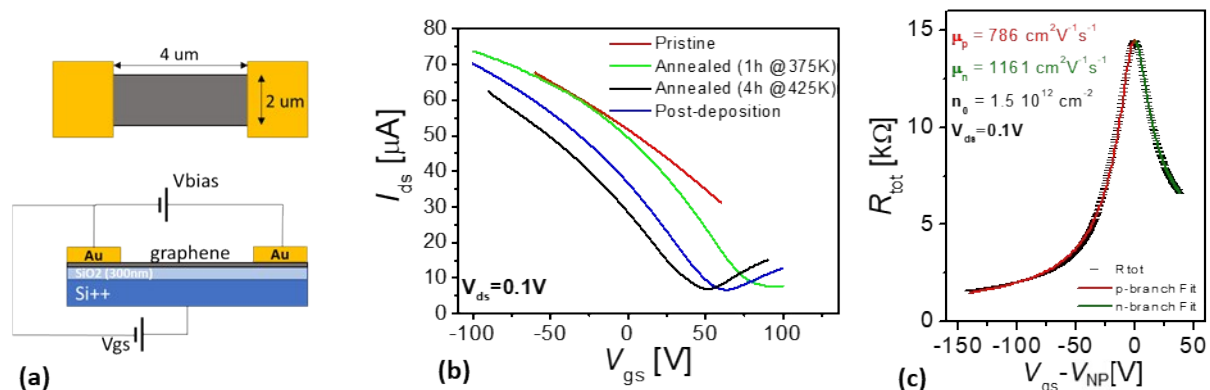


Figure S1 (a) Schematic depiction of the graphene FET ($L=4\mu\text{m}$, $W=2\mu\text{m}$) (b) Transfer curves acquired for a pristine graphene channel after a thermal annealing in vacuum at 375K for 1 hour, after 4 hours at 425K and after the deposition of 40nm thick PDI8-CN₂ thin film. (c) Total resistance of GFET, referred to the black curve in (b), fitted in order to estimate the gate-independent hole (μ_p) and electron mobility (μ_n), as well as the residual charge density (n_0). Neutrality point V_{NP} was found to be +50V.

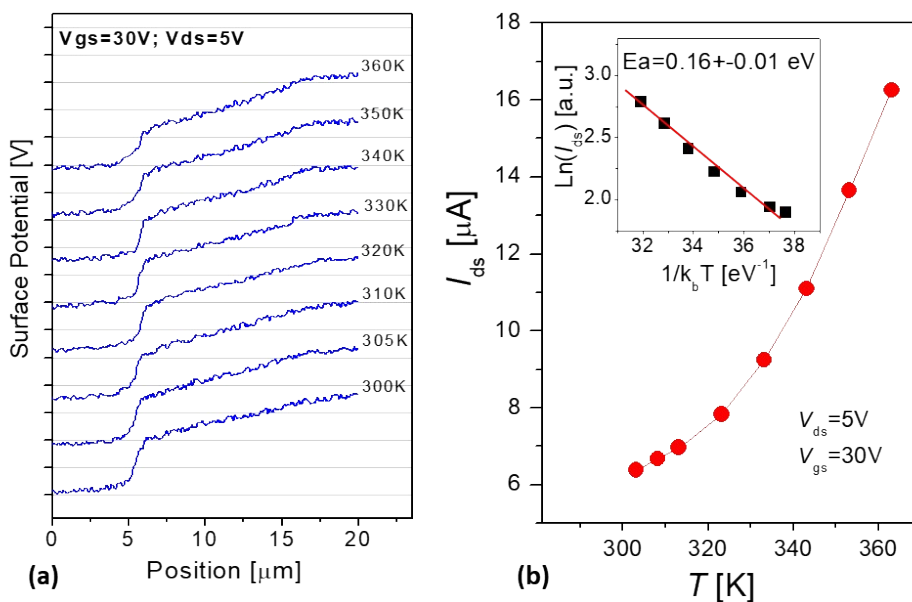


Figure S2 (a) Surface potential profiles as function of the temperature for PDI8-CN₂ OFETs with graphene electrodes ($V_{ds}=+5\text{V}$; $V_{gs}=+30\text{V}$). (b) Current values as function of the temperature monitored during the

acquisition of the surface potentials. The inset shows the Arrhenius plot from which an activation energy

$E_a=0.16\pm 0.01\text{eV}$ is inferred by considering a $I_{ds} \propto e^{-E_a/k_bT}$ relationship.

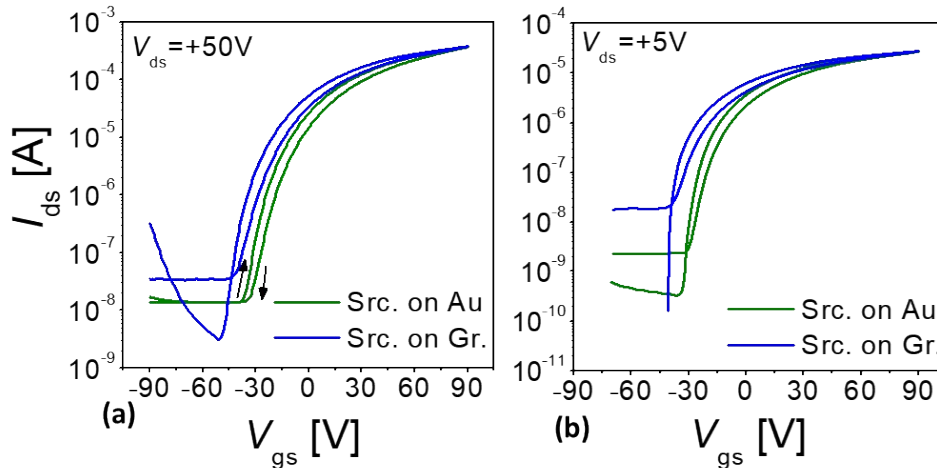


Figure S3 (a) and (b) Transfer curves of the mixed gold/graphene layouts in saturation (a) and linear (b) regimes. The responses achieved for the two different configurations (source-on-gold and source-on-graphene) are reported.

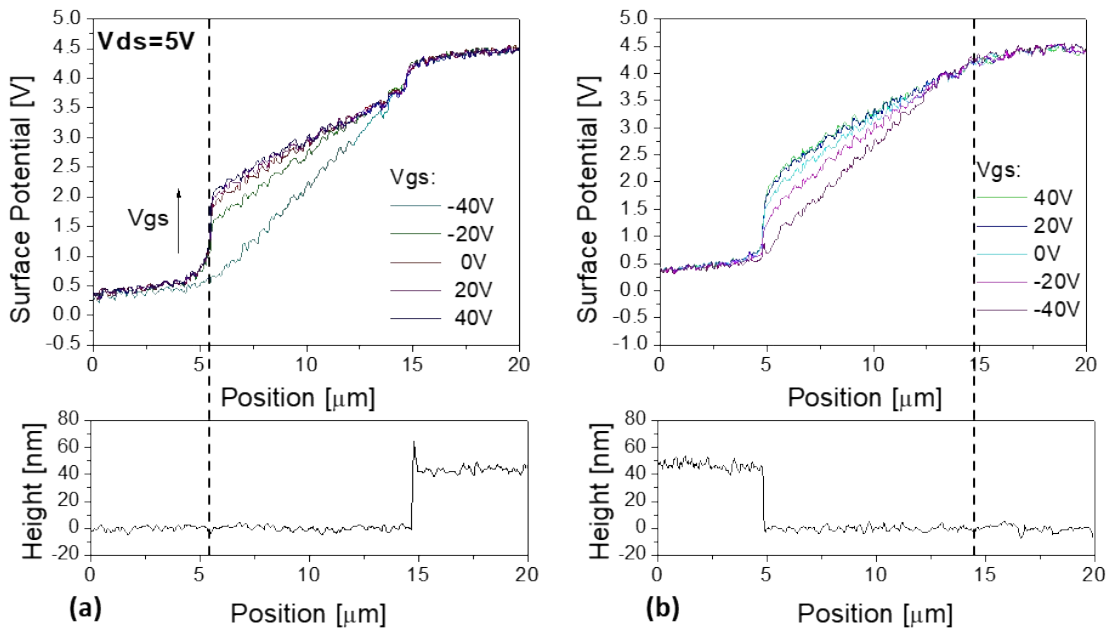


Figure S4 Complete overview of surface potential profiles recorded for the hybrid gold-graphene architecture, as function of the applied gate-source bias ($V_{ds}=+5\text{V}$) for (a) the source-on-graphene and (b) source-on-gold configurations, respectively. Lower panels show the corresponding topography of the transistor channel. Dashed vertical black lines indicate the graphene electrode boundaries.

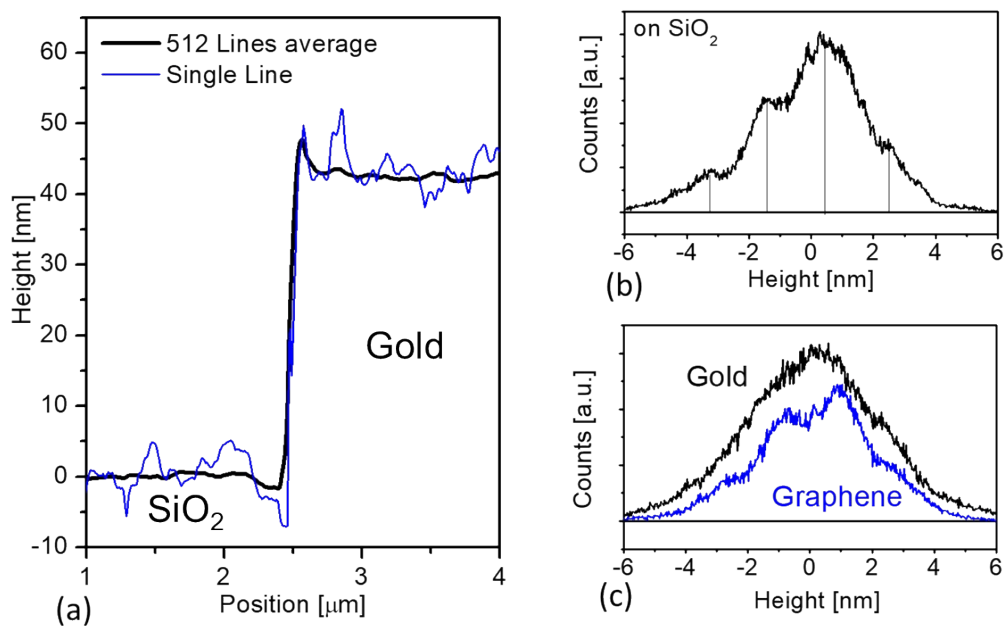


Figure S5 (a) Single profile (blue solid line) and average over 512 lines (black solid line) morphological close-up of the PDI8-CN₂/gold interface. It is possible to distinguish a distributed defective region at the very interface ($\approx 2.5\mu\text{m}$). (b) Height histogram retrieved from a $5\mu\text{m} \times 10\mu\text{m}$ AFM image (256×512 pixels) indicative of the PDI8-CN₂ thin film growth over the SiO₂ channel. From the analysis, it is possible to identify several peaks indicating the presence of the molecular planes of the polycrystalline morphology. (c) Similar analysis referred to PDI8-CN₂ films on both gold and graphene electrode surfaces.