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Supporting Information for “The Substrate is a pH-Controlled Second Gate of Electrolyte-Gated Organic Field-Effect Transistors”

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List of Figures:

- Transfer Characteristic in linear regime and Output characteristics;
- Overlay of the non-offset transfer characteristics at different pH values;
- AFM of the pentacene film in the transistor channel;
- pH-dependence of EGOFET devices built on 3-Amino-Propyl-Tri-Etoxy-Silane (APTES)-functionalized quartz;
- pH-dependence of the ON/OFF ratio

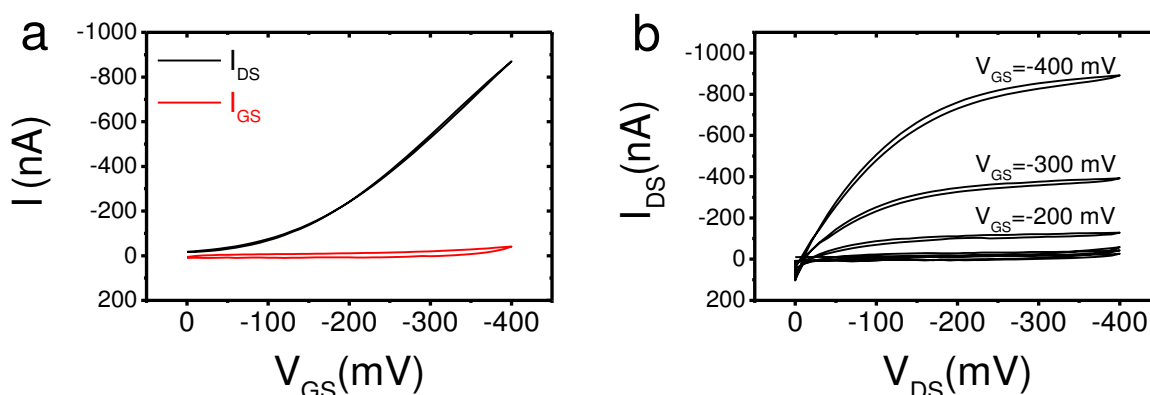


Fig. S1: a) Typical transfer characteristic in linear regime ($V_{DS}=-100$ mV), recorded at pH=7; b) Corresponding Output characteristics

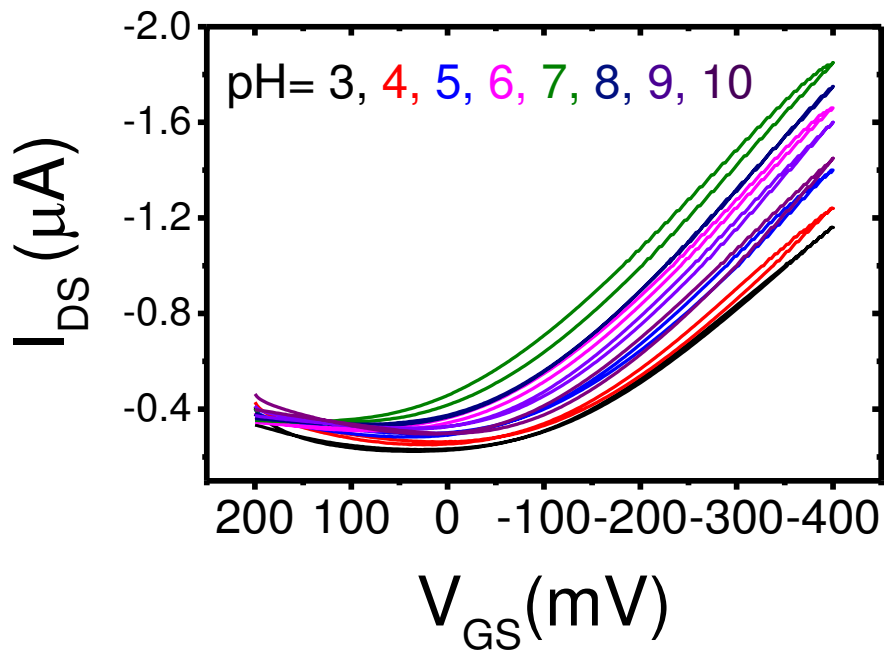


Fig. S2: Overlay of the non-offset transfer characteristics in saturation regime recorded at different electrolyte pH

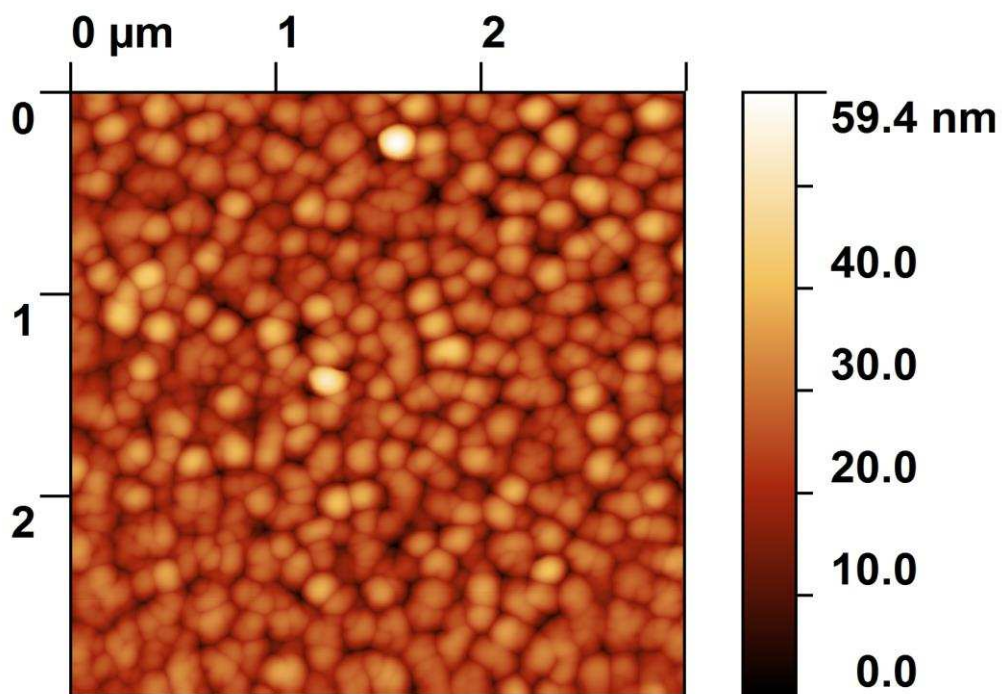


Fig. S3 AFM image of the pentacene semi-conductive channel. AFM characterization was performed with a NT-MDT head, using NT-MDT NSG01 cantilevers ($L=125 \pm 5 \mu\text{m}$; resonant frequency = 230 kHz; Force constant = 15.1 N/m). Growth is mainly 3D, resulting in smaller grains (average area = $19.5 \times 10^{-5} \text{m}^2$) and incomplete coverage of the substrate (i.e. pentacene covers roughly 70% of the total scanned area)

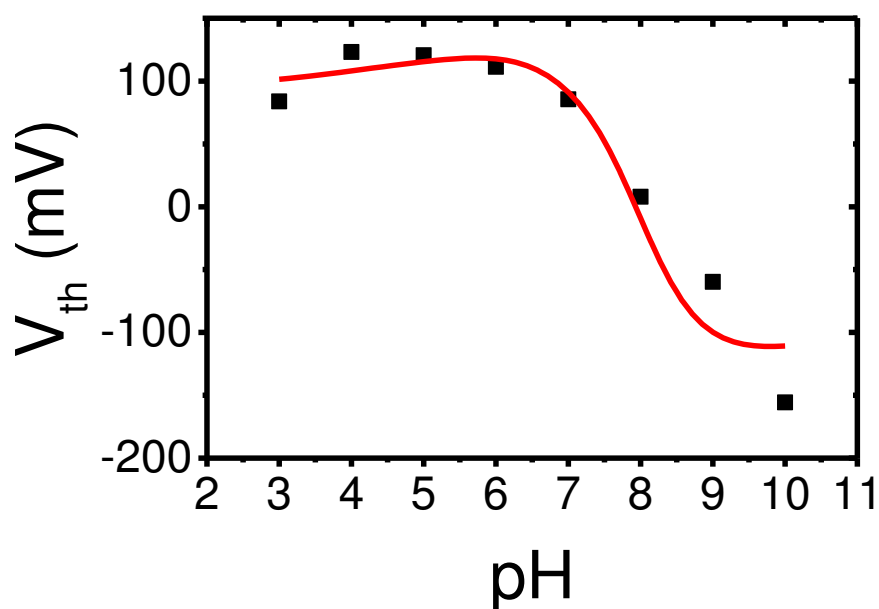


Fig. S4 V_{th} of an EGOFET built on APTES functionalized quartz vs pH and relative fit with the model. Functionalization of this device was carried out by immersion in a 3% solution of APTES in Ethanol for 1 h at room temperature, characterization followed the protocol discussed in the main text. Parameters for this fitting are: $Q_{int} = -2.19 \mu\text{C}$; $\alpha = -8.12 \text{ mV}$; $N_s = 2.19 \cdot 10^{16}$; $k_a = 1.003 \cdot 10^{-6}$

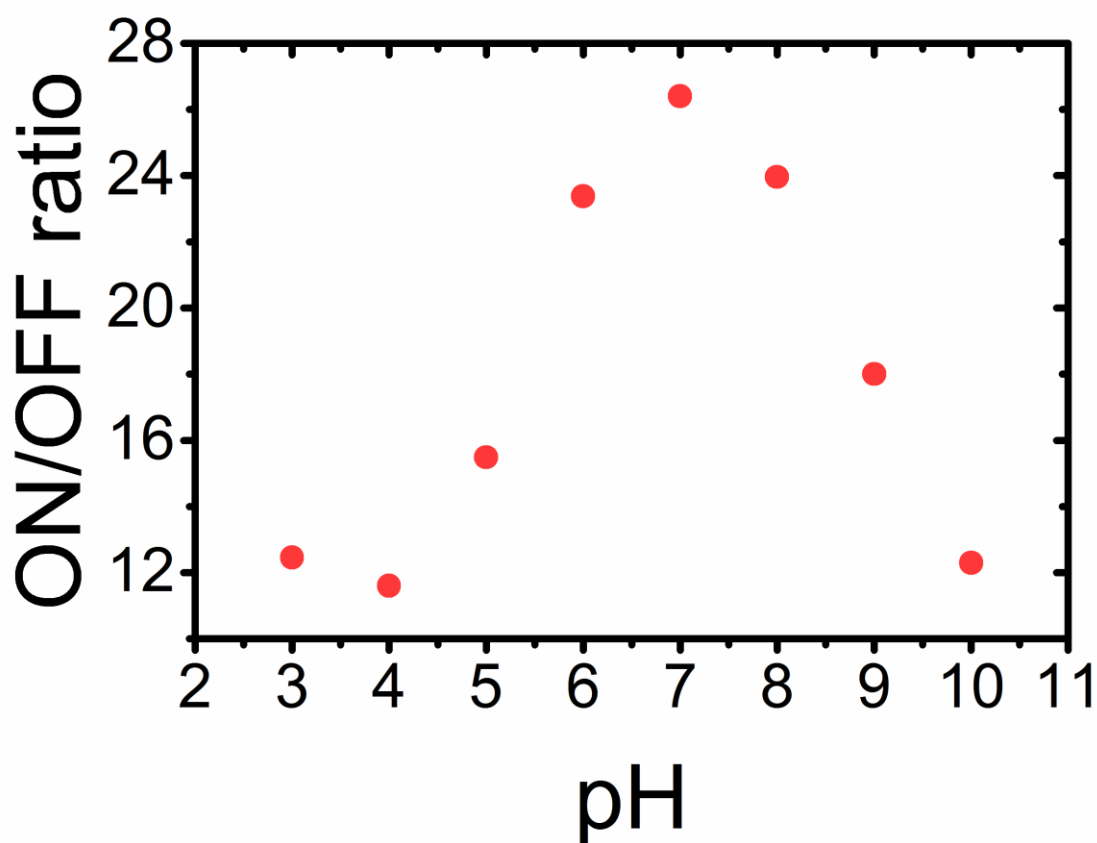


Fig. S5 ON/OFF ratio vs pH, this parameter does not exhibit significant dependence on pH (maximum variation is only 17% of the maximum value)