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

M. Di Lauro¹, S. Casalini¹, M. Berto¹, A. Campana², T. Cramer³, M. Murgia², M. Geoghegan^{1,4}, C. A. Bortolotti^{1,5}, F. Biscarini^{1*}

¹Dipartimento di Scienze della Vita, Università di Modena e Reggio Emilia, Via G. Campi 103, 41125 Modena, Italy

²Consiglio Nazionale delle Ricerche, Istituto per lo Studio dei Materiali Nanostrutturati (CNR-ISMN), Via P. Gobetti 101, 40129 Bologna, Italy

³Dipartimento di Fisica e Astronomia, Alma Mater Studiorum-Università degli Studi di Bologna, V.le Berti-Pichat 6/2, 40127 Bologna, Italy

⁴Department of Physics and Astronomy, University of Sheffield, Hounsfield Road, Sheffield S3 7RH, UK

⁵Consiglio Nazionale delle Ricerche, CNR-NANO Via Campi 213/a, 41125 Modena, Italy

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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

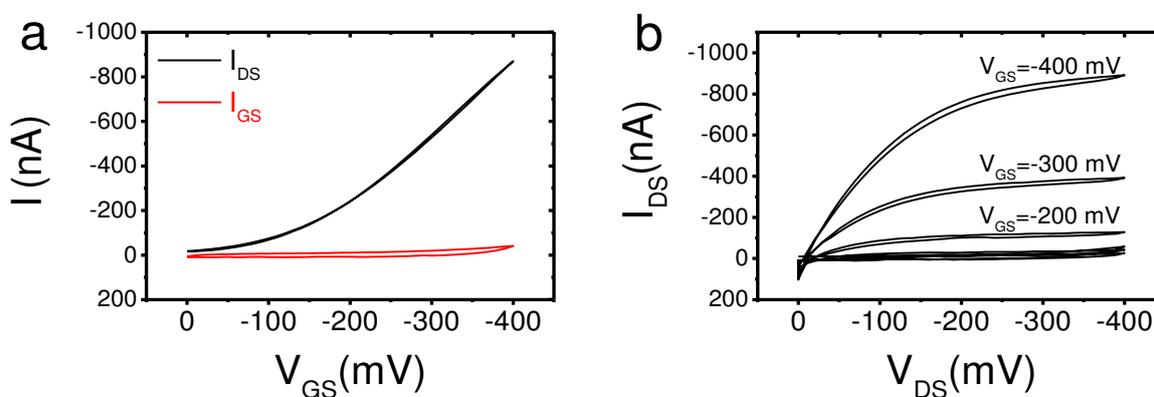


Fig. S1: a) Typical transfer characteristic in linear regime ($V_{DS}=-100$ mV), recorded at pH=7; b) Corresponding Output characteristics

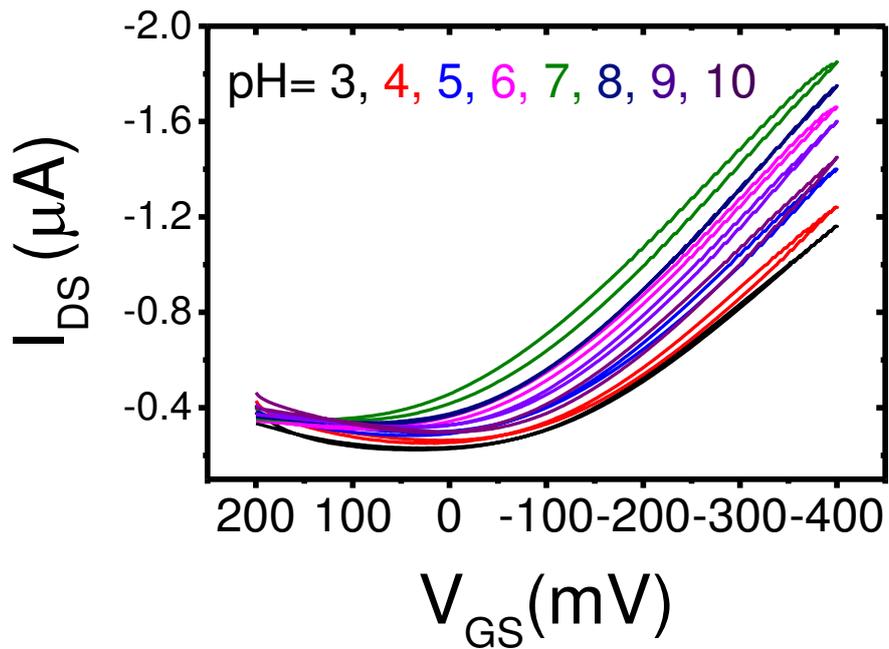


Fig. S2: Overlay of the non-offset transfer characteristics in saturation regime recorded at different electrolyte pH

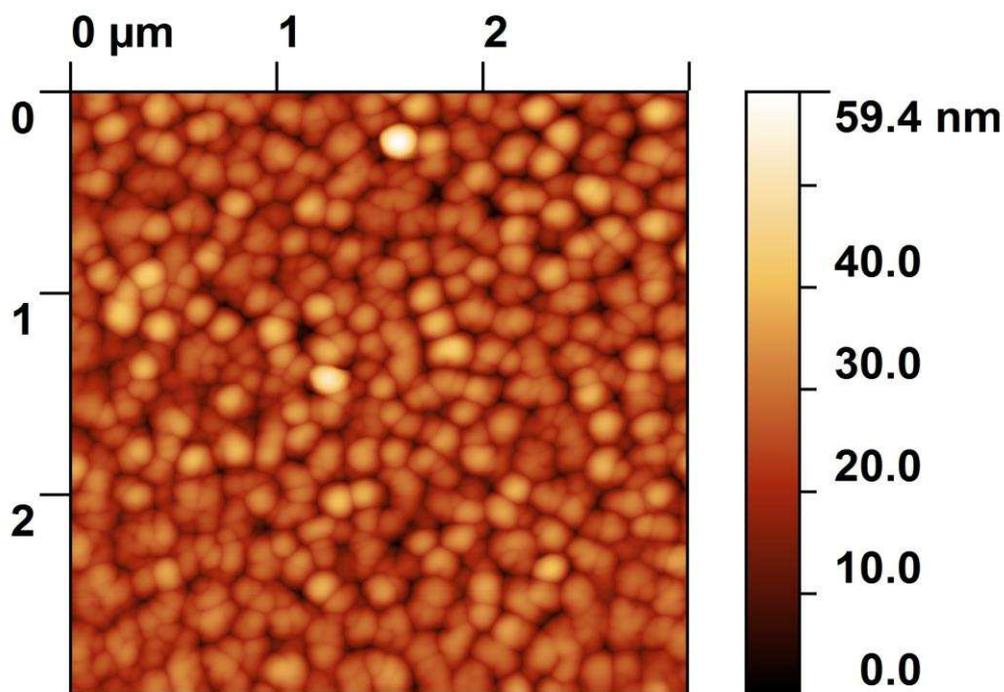


Fig. S3 AFM image of the pentacene semi-conductive channel. AFM characterization was performed with a NT-MDT head, using NT-MDT NSG01 cantilevers ($L=125 \pm 5 \mu m$; resonant frequency = 230 kHz; Force constant = 15.1 N/m). Growth is mainly 3D, resulting in smaller grains (average area = $19.5 \times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

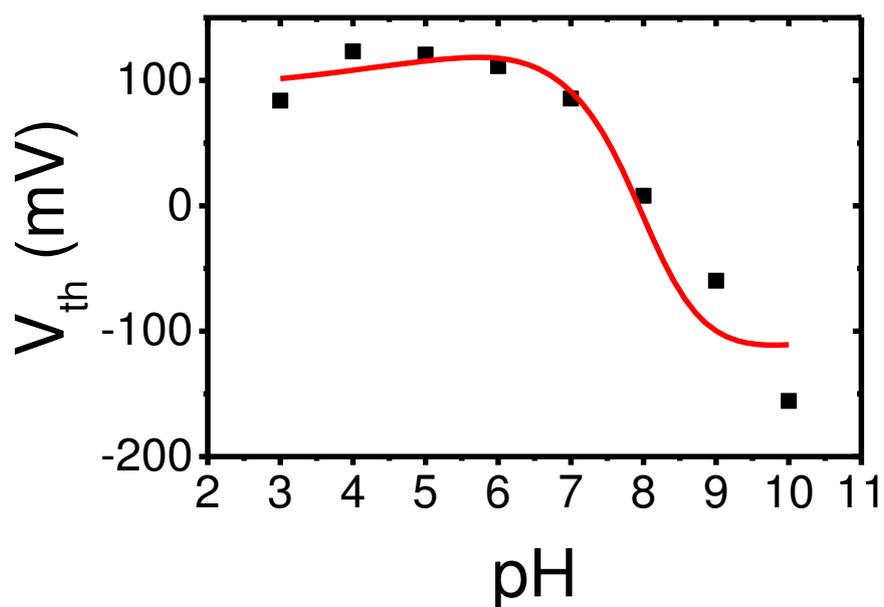


Fig. S4 V_{th} of an EGO-FET built on APTES functionalized quartz vs pH and relative fit with the model. Functionalization of this device was carried out by immersion in a 3% solution of APTES in Ethanol for 1 h at room temperature, characterization followed the protocol discussed in the main text. Parameters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

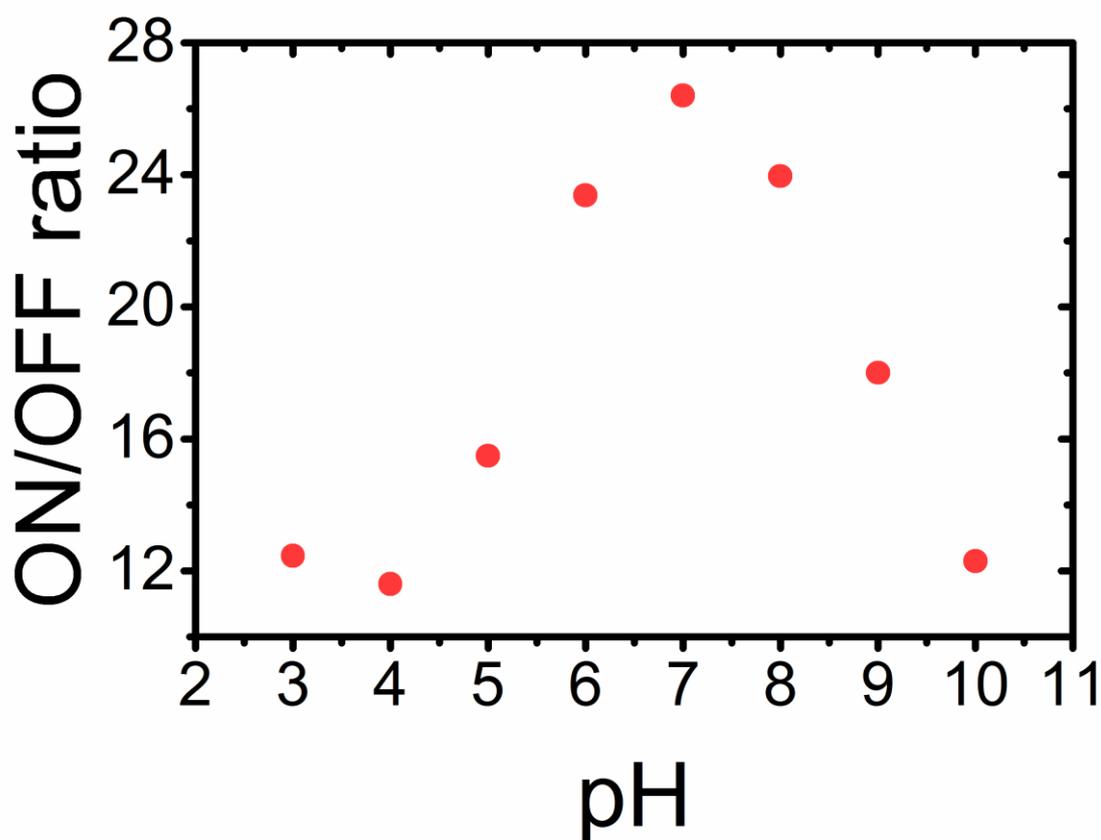


Fig. S5 ON/OFF ratio vs pH, this parameter does not exhibit significant dependence on pH (maximum variation is only 17% of the maximum value)