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Electronic Supplementary Information

Electrolyte-gated nanostructured ZnO transistors for environmental and biological sensing

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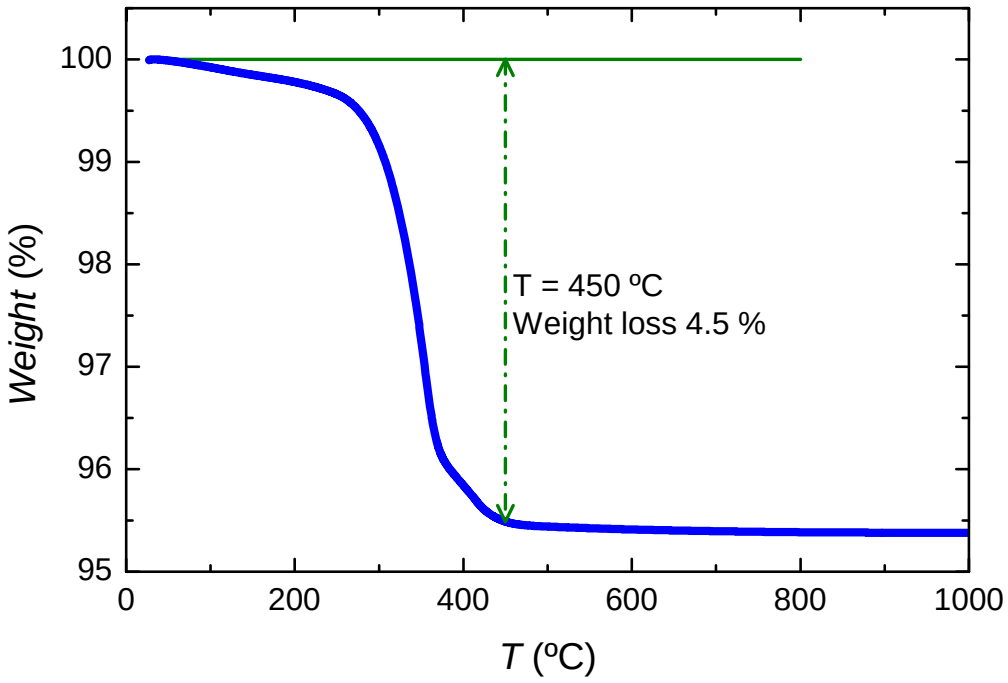

Figure S1. Thermogravimetric analysis of a dry sample of the ZnO nanoparticles used as the semiconducting channel (dispersions were obtained from Sigma Aldrich) in electrolyte-gated transistors. At the annealing temperature used for device preparation (450 ºC), the weight loss is

about 4.5 % and no substantial mass change is observed when further increasing the temperature to 1000 ºC.

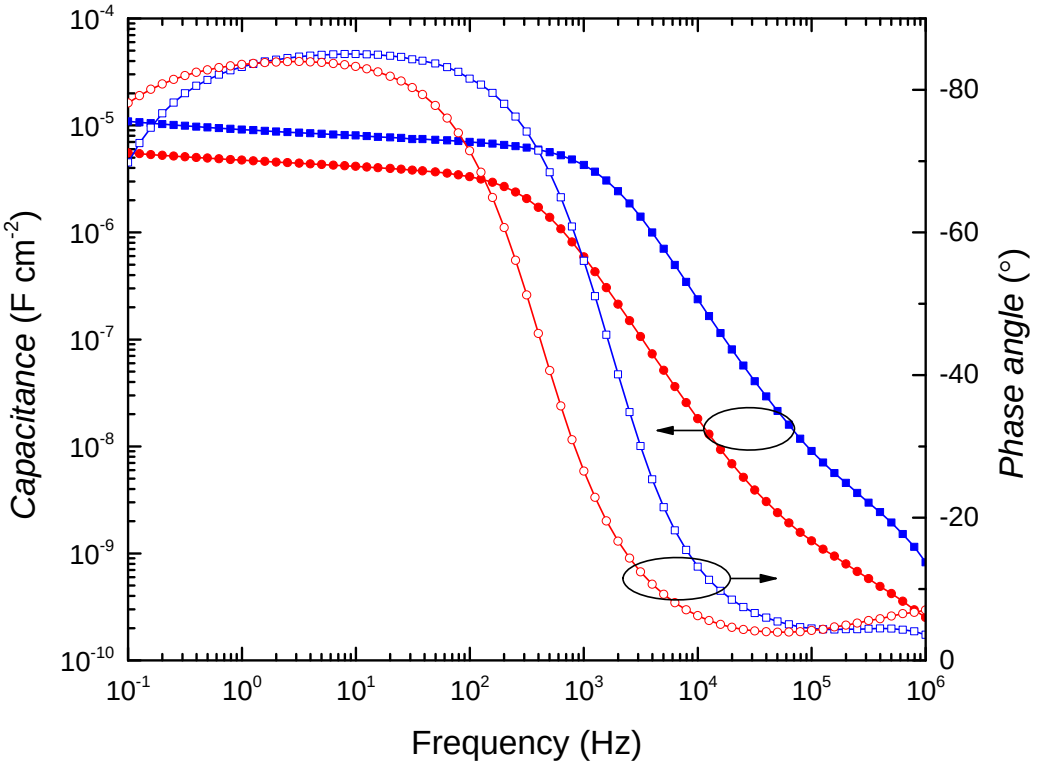

Figure S2. Capacitance (*full squares*) and phase angle (*open squares*) of a nanostructured ZnO films deposited onto an ITO electrode and measured in the three electrode configuration. The specific capacitance was extracted at the minimum of the phase angle (capacitive regime, -85.1º at 10 Hz) and scaled to the electrode area (4.46 mm^2). The capacitance and the phase angle for a flat ZnO layer, deposited by a sol-gel method, are also reported (*full and open circles*). At 10 Hz, the capacitance of the nanostructured ZnO is ~1.9× that of the flat film, confirming the increment of the surface area.

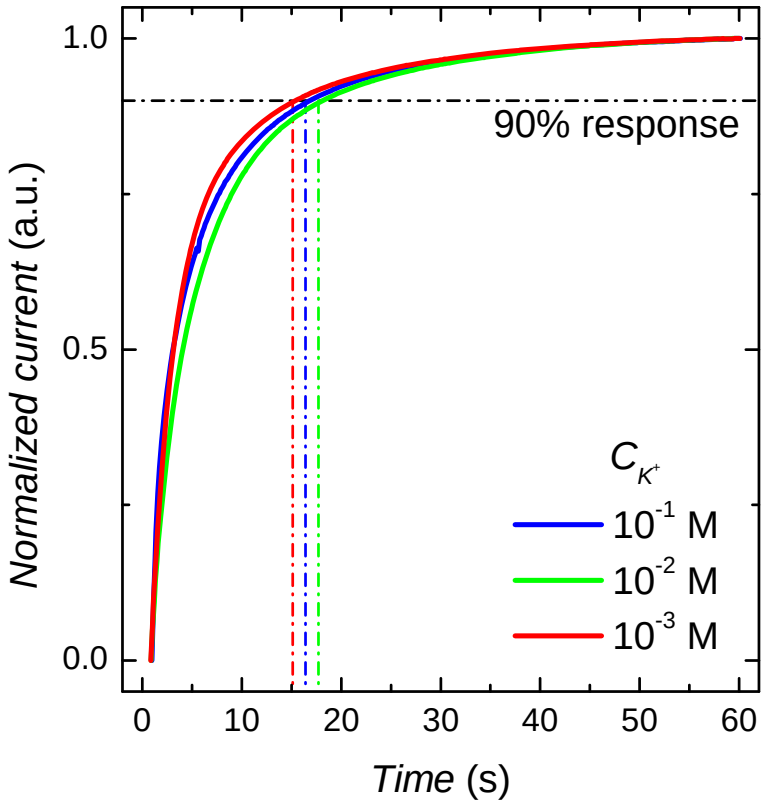

Figure S3. Normalized current response of the ion-selective electrolyte-gated transistor (IS-EGT) to different concentrations of potassium in water (C_{K+}). The time to reach 90% of the equilibrium current (t_{90}) is highlighted for the three different concentrations.

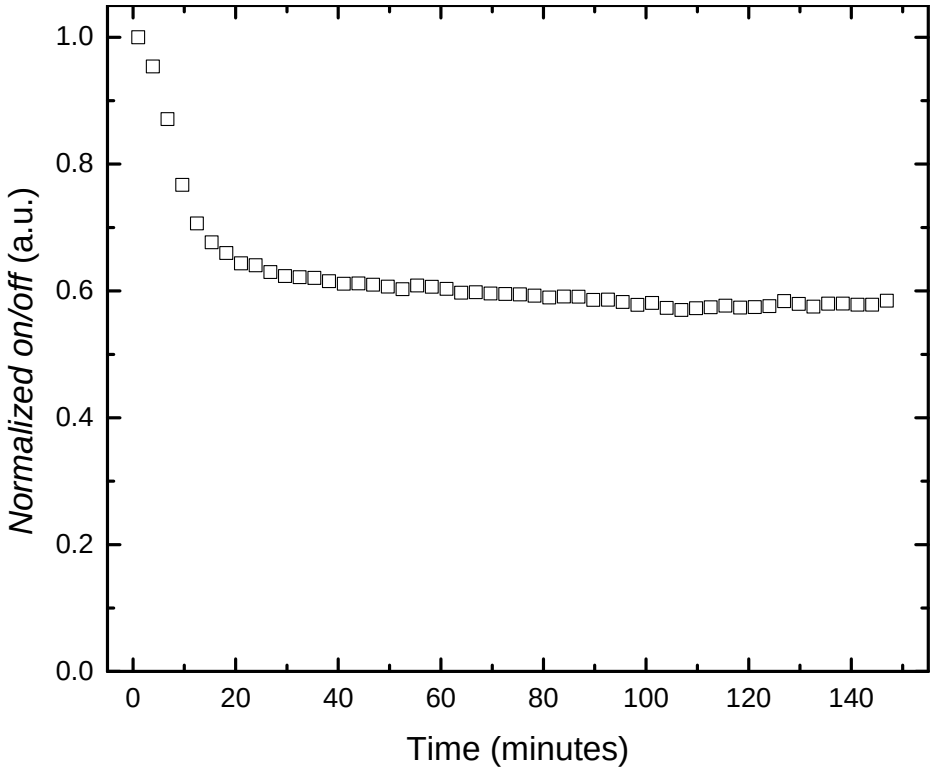

Figure S4. Normalized *on/off* ratio vs. time for the water-gated ZnO EGT. For this test, the transistor has been driven at V_d=0.4 V, while switching the gate bias between V_g=0 V (*off*) and V_g=0.9 V (*maximum transconductance*) with a period of 180 s. After 2.5 h, the *on/off* ratio is still at about 60% of its maximum value.