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Delta-9-Tetrahydrocannabinol (Δ^9-THC) Sensing Using Aerosol Jet Printed Organic Electrochemical Transistor (OECT)

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Supporting Information

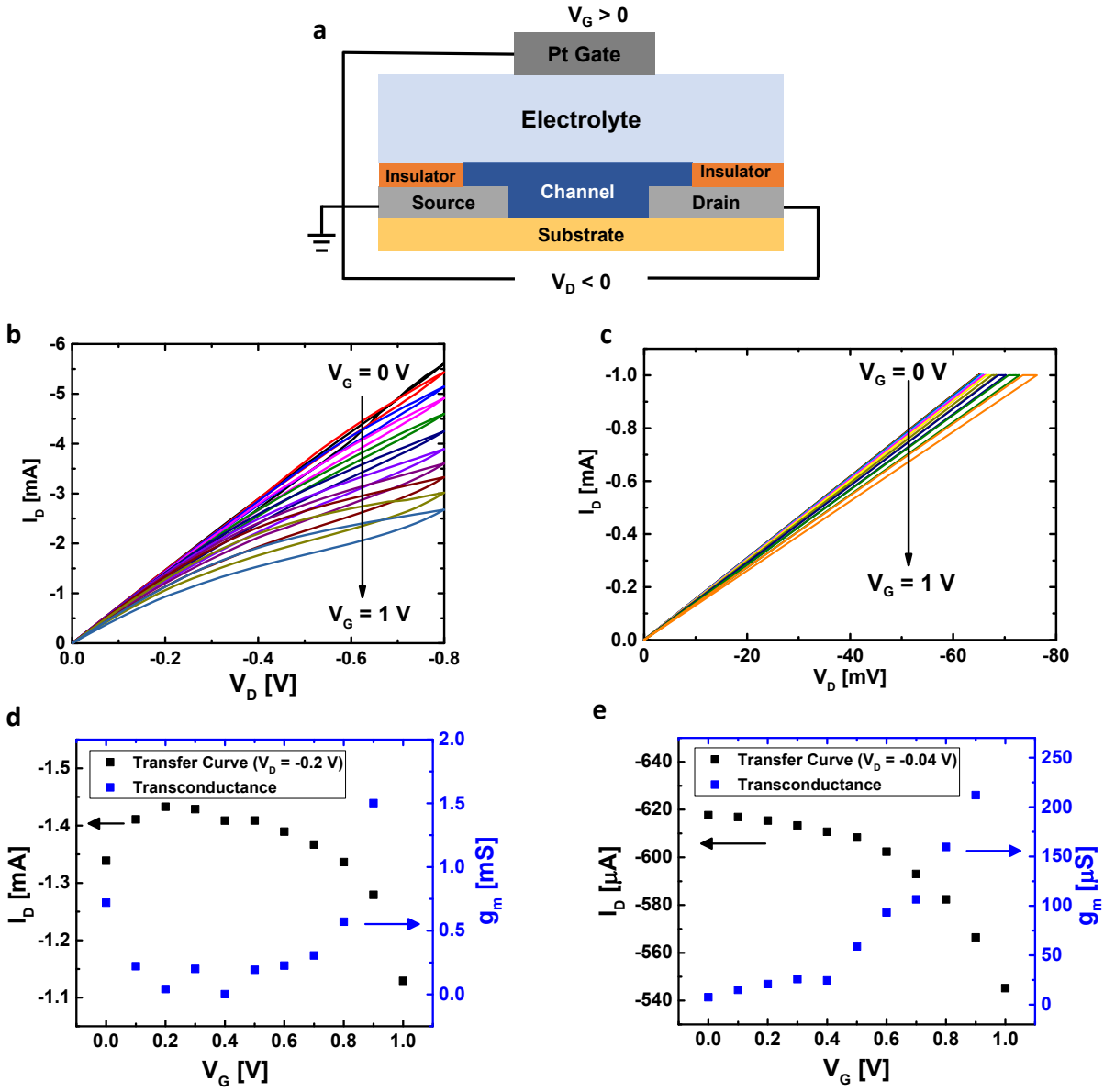

Figure S1. (a) Schematic of an OECT. (b) Transfer curves and the corresponding transconductance for an OECT measured with 10 mM NaCl and a Pt gate at a constant drain bias of V_D = -0.2 V with a peak transconductance of 1.5 mS at V_G of 1 V. (c) Transfer curves and the corresponding transconductance for an OECT measured with DI water and a Pt gate under constant drain bias of V_D = -0.04 V with a peak transconductance of 0.212 mS. (d) The output characteristics of an OECT measured with 10 mM NaCl and Pt gate. (e) The output characteristics of an OECT measured with DI water and Pt gate.

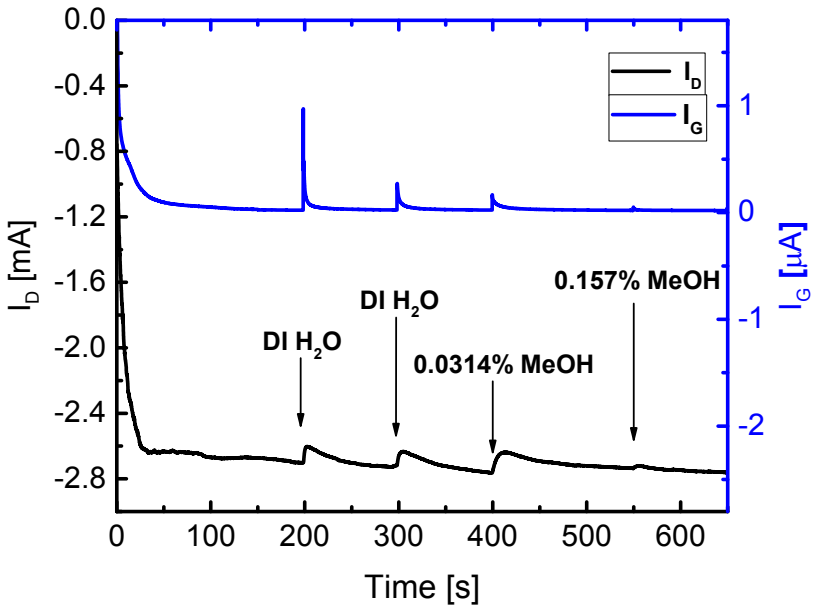

Figure S2. Drain current (I_D) response (black curve) of a 3D printed OECT to the addition of DI water and methanol (MeOH) and the corresponding gate current (I_G) response (blue curve). The device was biased at constant voltages (V_G = -1 V and V_D = -0.2 V). 0.0314% v/v MeOH in DI water is the concentration of MeOH in 1μM Δ^9-THC solution in DI water. 0.157% v/v of MeOH in DI water is equivalent to the concentration of MeOH in 1μM Δ^9-THC solution in DI water. Even though there is a peak induced by each DI water addition, I_D settles to similar level as before within 100s. I_D decreased slightly after adding MeOH solution due to the oxidation reaction of MeOH molecules at the Pt wire surface. Since the highest concentration of Δ^9-THC tested in this work is 5 μM (0.157% v/v MeOH), the effect of methanol oxidation is negligible.

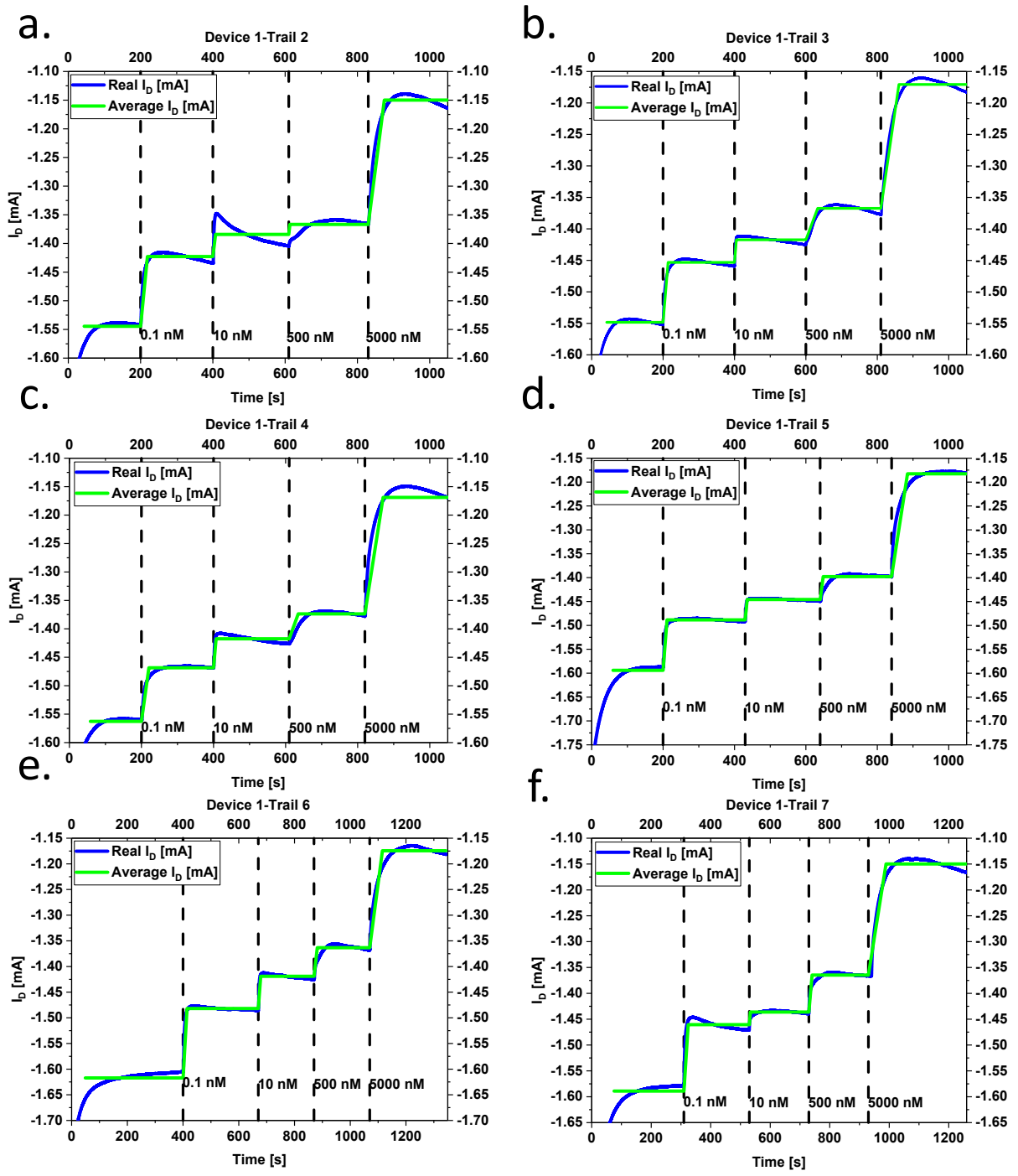

Figure S3. Six of the remaining seven trials of Δ^9-THC concentration measurement using the same device as shown in Figure 3(a).

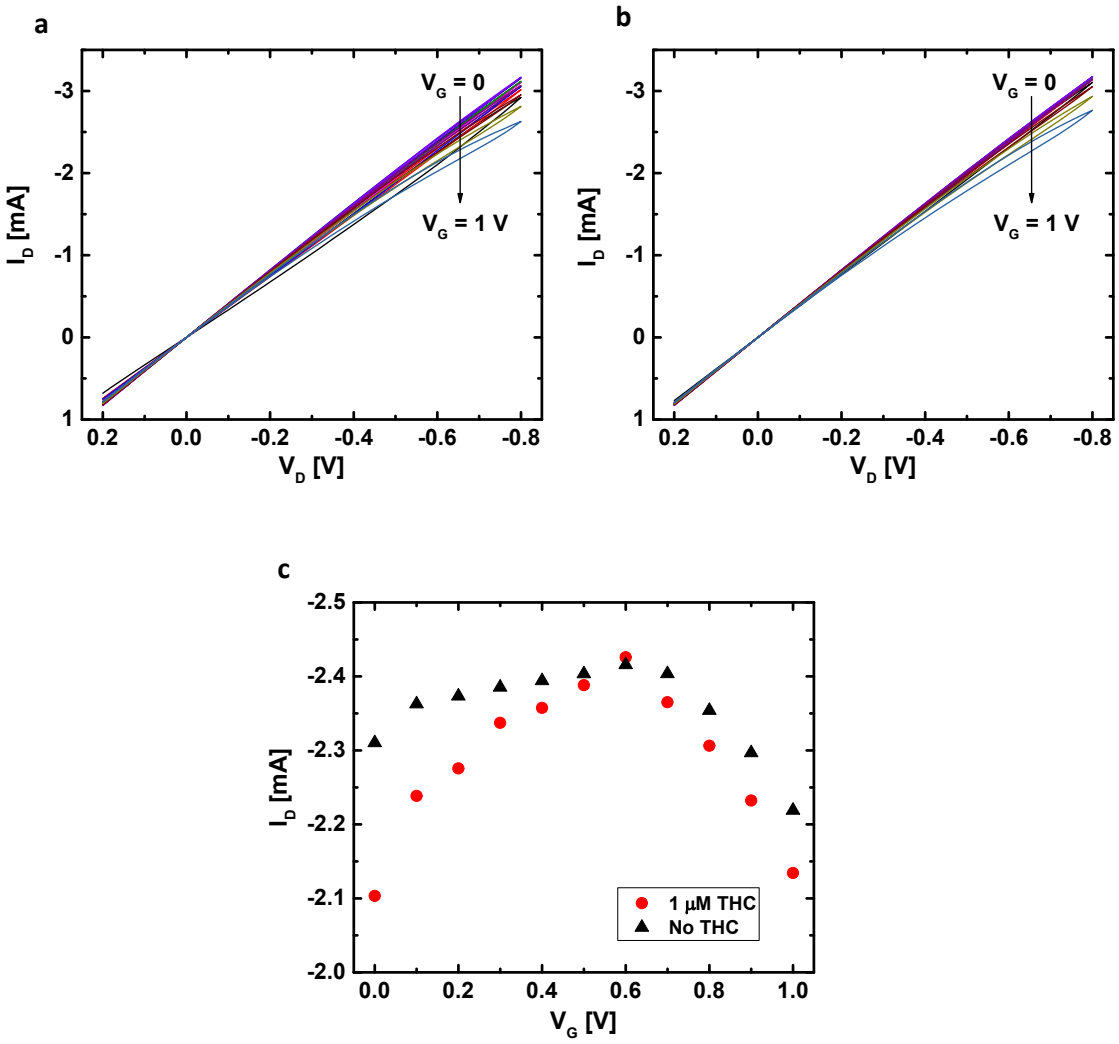

Figure S4. The family of curves of an OECT measured with Pt gate and (a) 1 µM Δ^9-THC diluted in saliva buffer and (b) saliva buffer only as the electrolyte. (c) Shift of transfer curve extracted from the family of curves at V_D = -0.6 V for the two measurements. There is a clear decrease in the drain current with the presence of Δ^9-THC.