Supplementary Information

Forensic electrochemical sensor for fentanyl and morphine detection using an Au–NiO_x-electrodeposited carbon electrode

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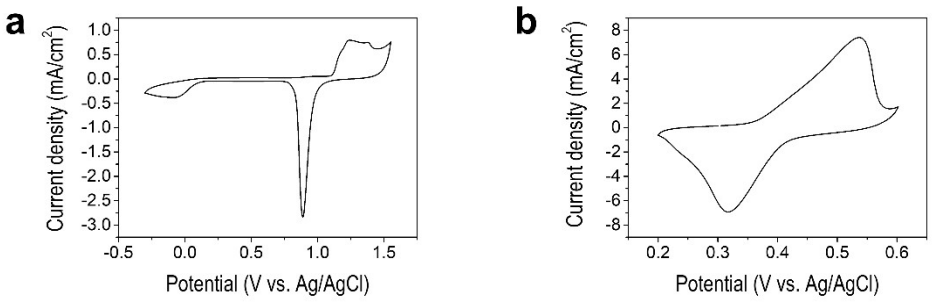

Fig. S1. Electrochemical confirmation of electrodeposited Au and NiO_x on SPCE. (a) Cyclic voltammogram in 0.5 M H_2SO_4 at a scan rate of 100 mV/s to confirm the electrodeposited Au. (b) Cyclic voltammogram in 0.5 M NaOH at a scan rate of 100 mV/s to confirm and activate the electrodeposited NiO_x.

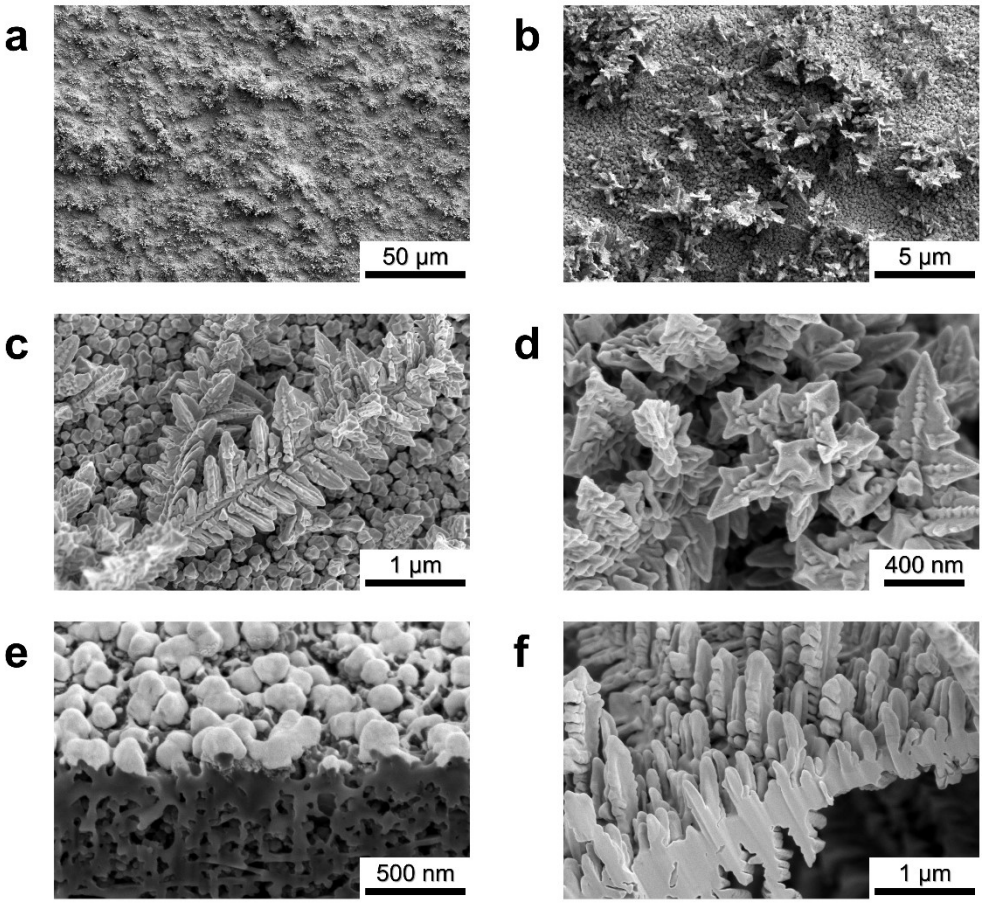

Fig. S2. FIB/FE-SEM images of the Au-modified SPCE. (a–c) Images of the Au-modified SPCE surface morphology observed with increasing magnification. (d) Enlarged image of the over-electrodeposited portion of Au. (e, f) Cross-sectional images of Au electrodeposited above the electrode surface and in the over-electrodeposited portion, respectively.

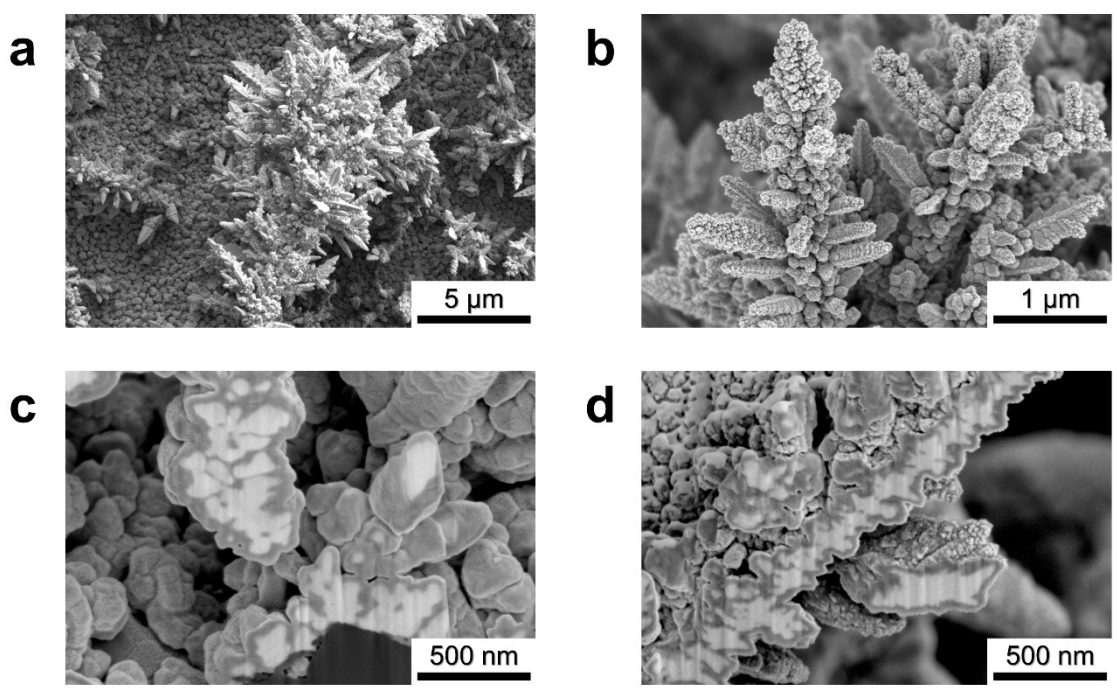

Fig. S3. FIB/FE-SEM images of the Au–NiO_x-modified SPCE showing branched, leaf-like regions formed by electrodeposition overgrowth. (a, b) Surface morphology images observed with increasing magnification. (c, d) Cross-sectional images obtained by moving the position from the bottom to the top of the over-electrodeposited portion.

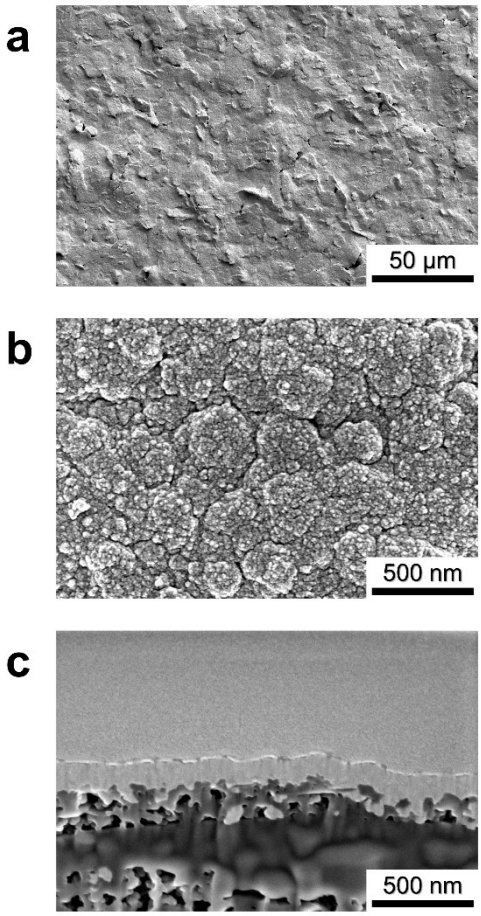

Fig. S4. FIB/FE-SEM images of the NiO_x-modified SPCE. (a–b) Images of the NiO_x-modified SPCE surface morphology observed with increasing magnification. (c) Cross-sectional image of the NiO_x-modified SPCE.

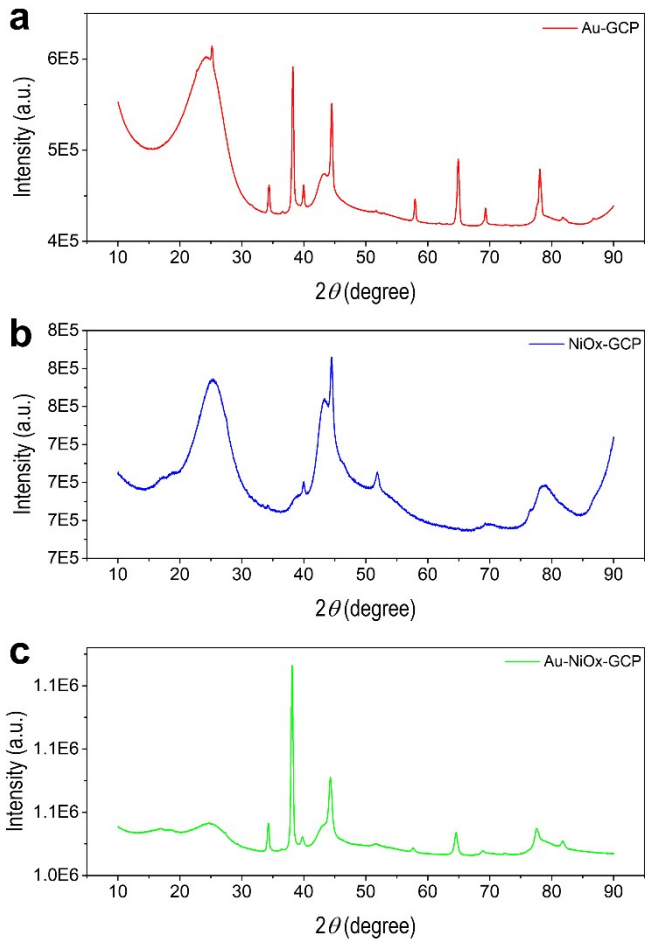

Fig. S5. XRD patterns of (a) Au-GCP, (b) NiO_x-GCP, and (c) Au-NiO_x-GCP electrodes.