

Supplementary information

Biohybrid Nanostructured Ceria/Glucose Oxidase Electrodes Enabling Enzyme Glucose Oxidation with Pseudocapacitive Charge Buffering

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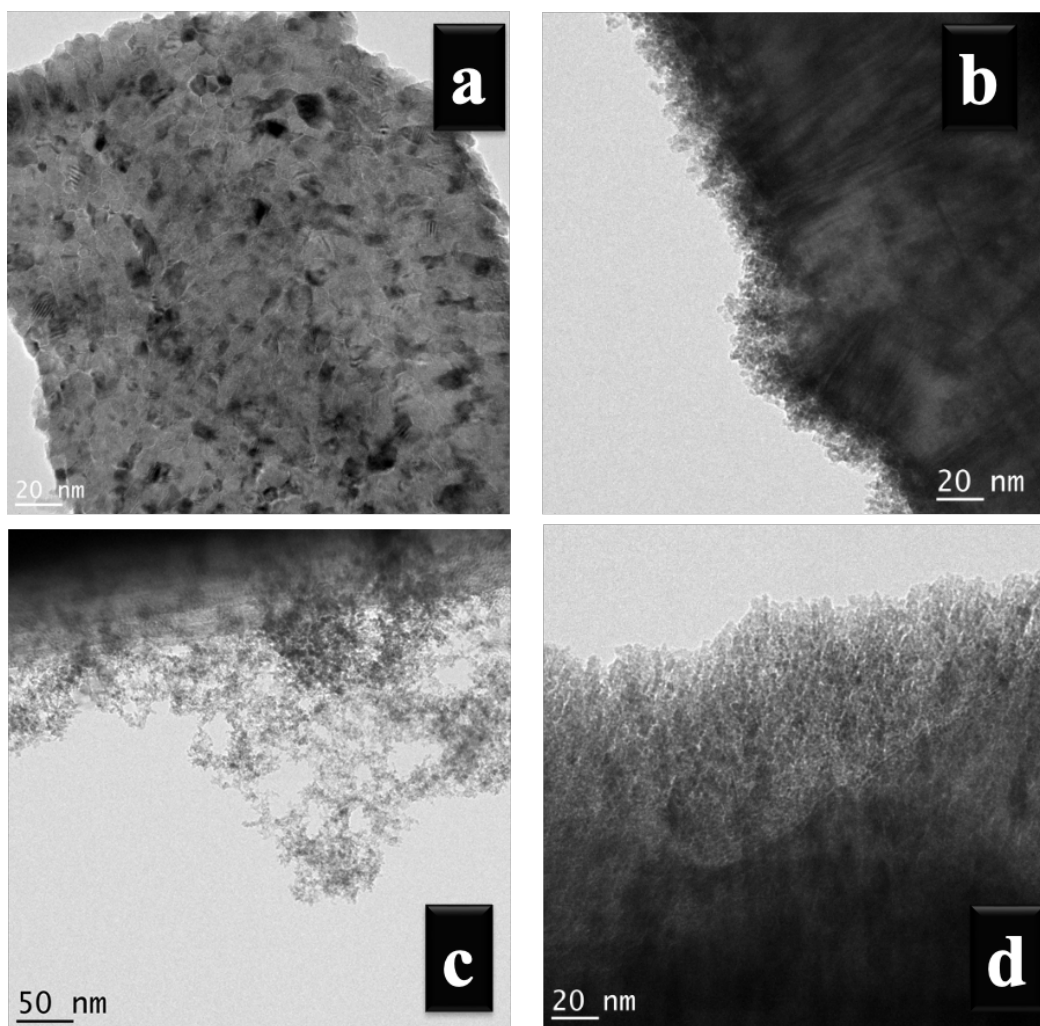


Figure S1 TEM images of PLD-grown CeO_2 film deposited on carbon paper under different atmospheres. (a) $(\text{CeO}_2)_{\text{UV}}$, (b) $(\text{CeO}_2)_{0.5\text{The}}$, (c) $(\text{CeO}_2)_{2\text{The}}$ and (d) $(\text{CeO}_2)_{10\text{mTO}_2}$.

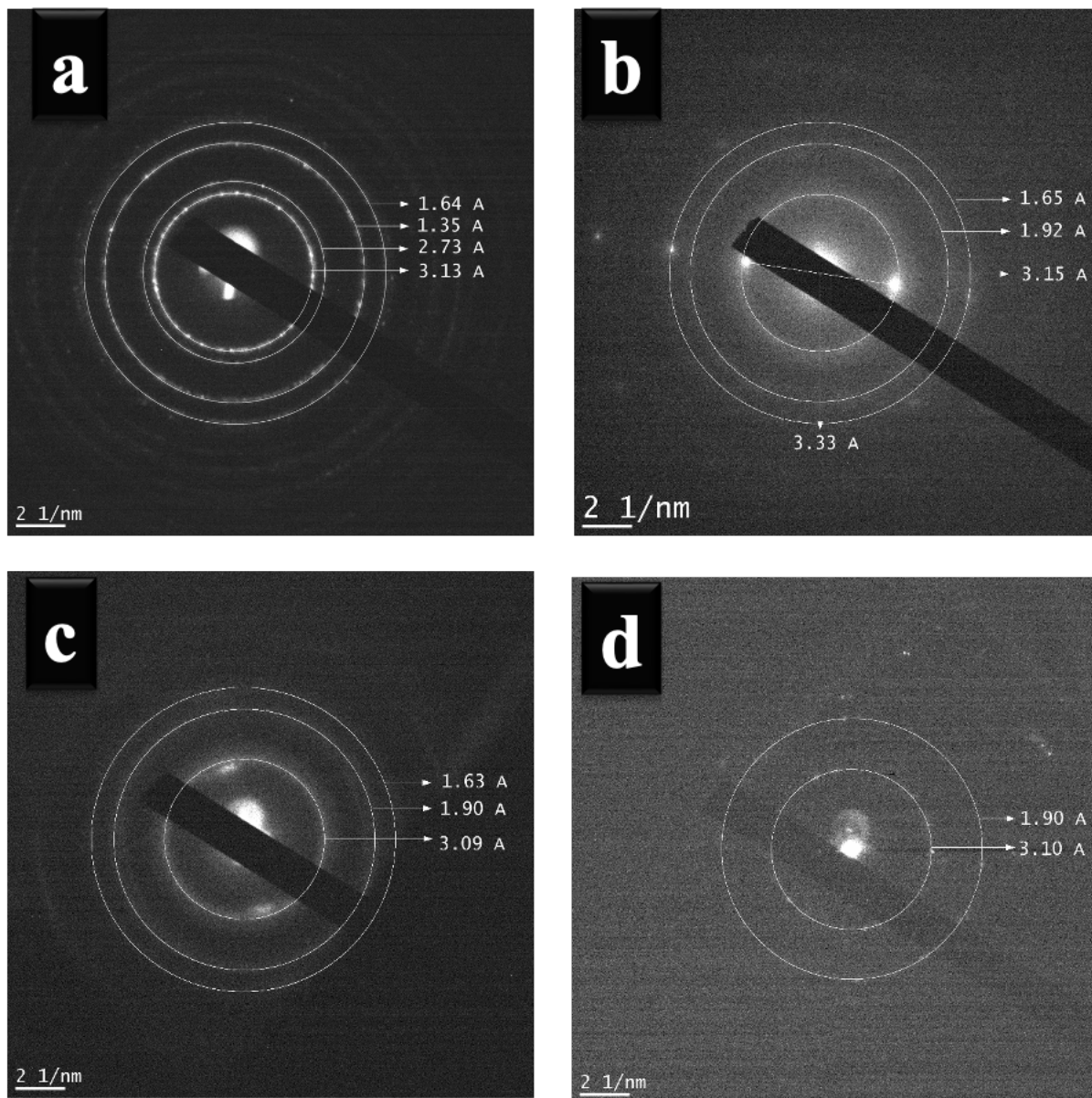


Figure S2 SAED patterns of PLD-deposited CeO_2 films prepared under different atmospheres: (a) $(\text{CeO}_2)_{\text{UV}}$, (b) $(\text{CeO}_2)_{0.5\text{THe}}$, (c) $(\text{CeO}_2)_{2\text{THe}}$, and (d) $(\text{CeO}_2)_{10\text{mTO}_2}$.

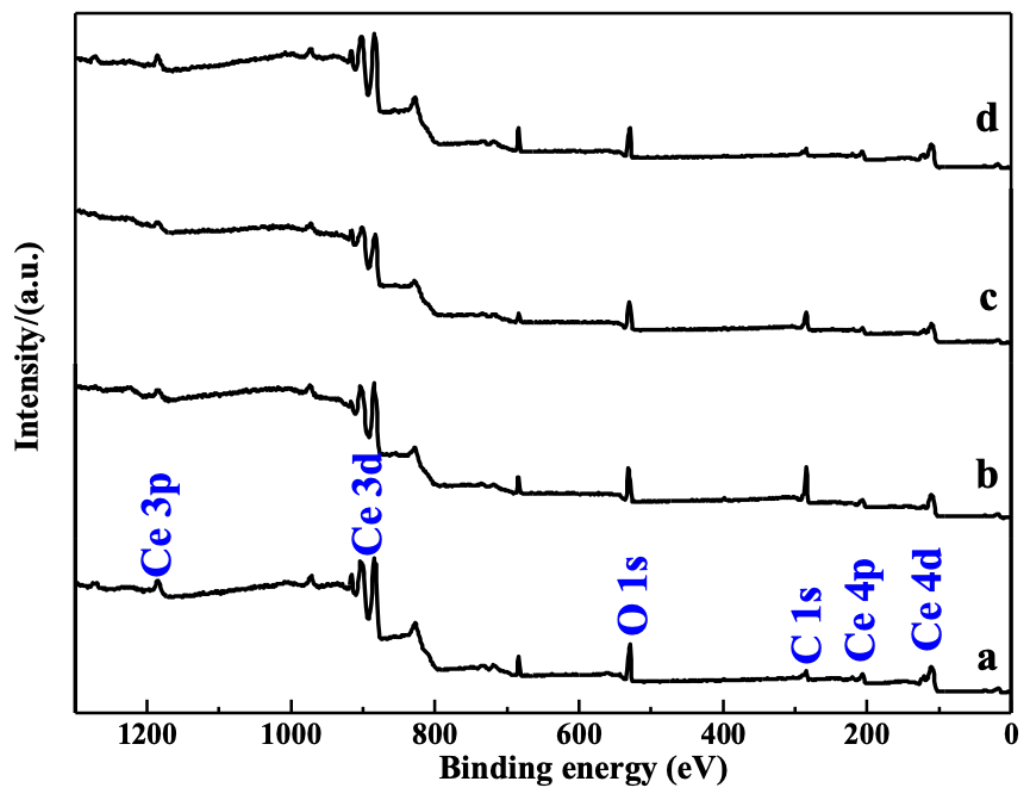


Figure S3 PLD-grown CeO₂ film deposited on carbon paper under different atmospheres. (a) (CeO₂)_{UV}, (b) (CeO₂)_{0.5THe}, (c) (CeO₂)_{2THe} and (d) (CeO₂)_{10mTO2}.

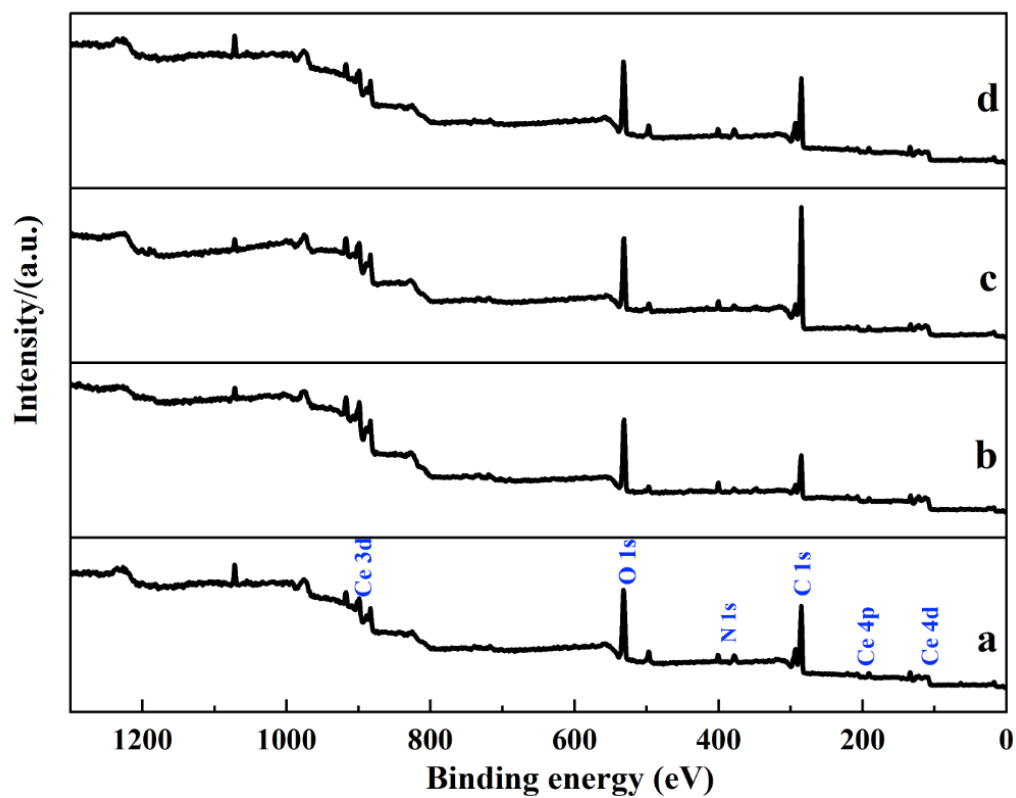


Figure S4 XPS survey spectra of GOx immobilized onto CeO₂. (a) (CeO₂)_{UV}/GOx, (b) (CeO₂)_{0.5TH₂}/GOx, (c) (CeO₂)_{2TH₂}/GOx and (d) (CeO₂)_{10mTO₂}/GOx.

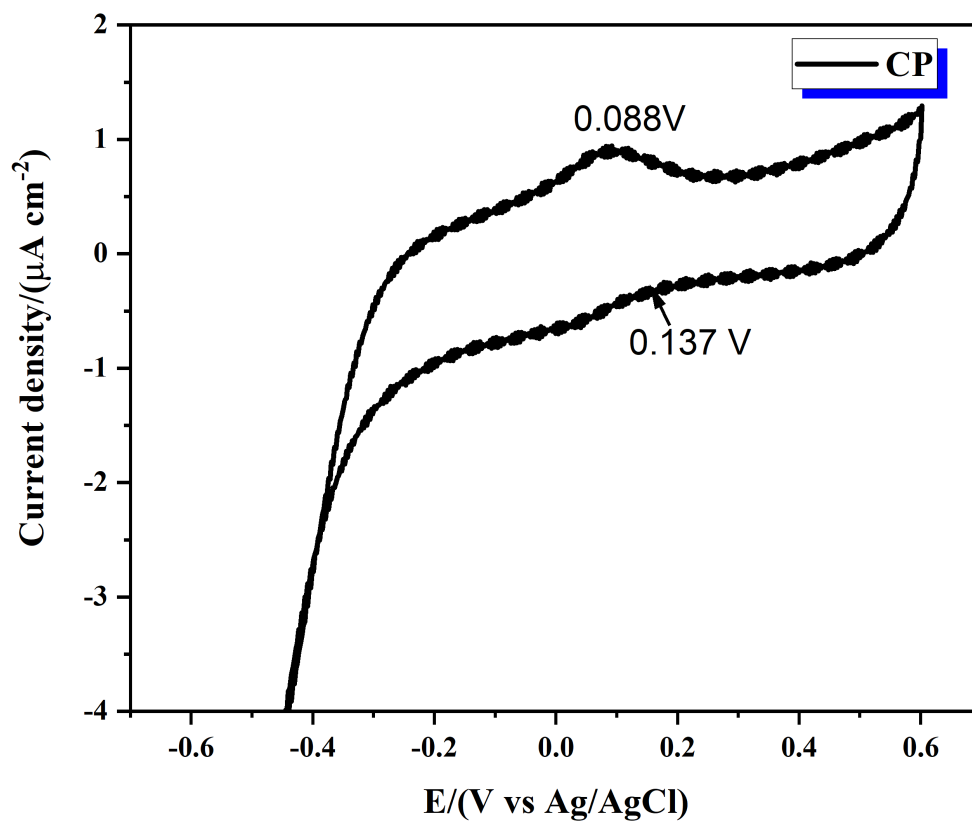


Figure S5 Cyclic voltammogram of bare carbon paper (CP) substrate recorded in PBS solution at a scan rate of 20 mV s^{-1} .

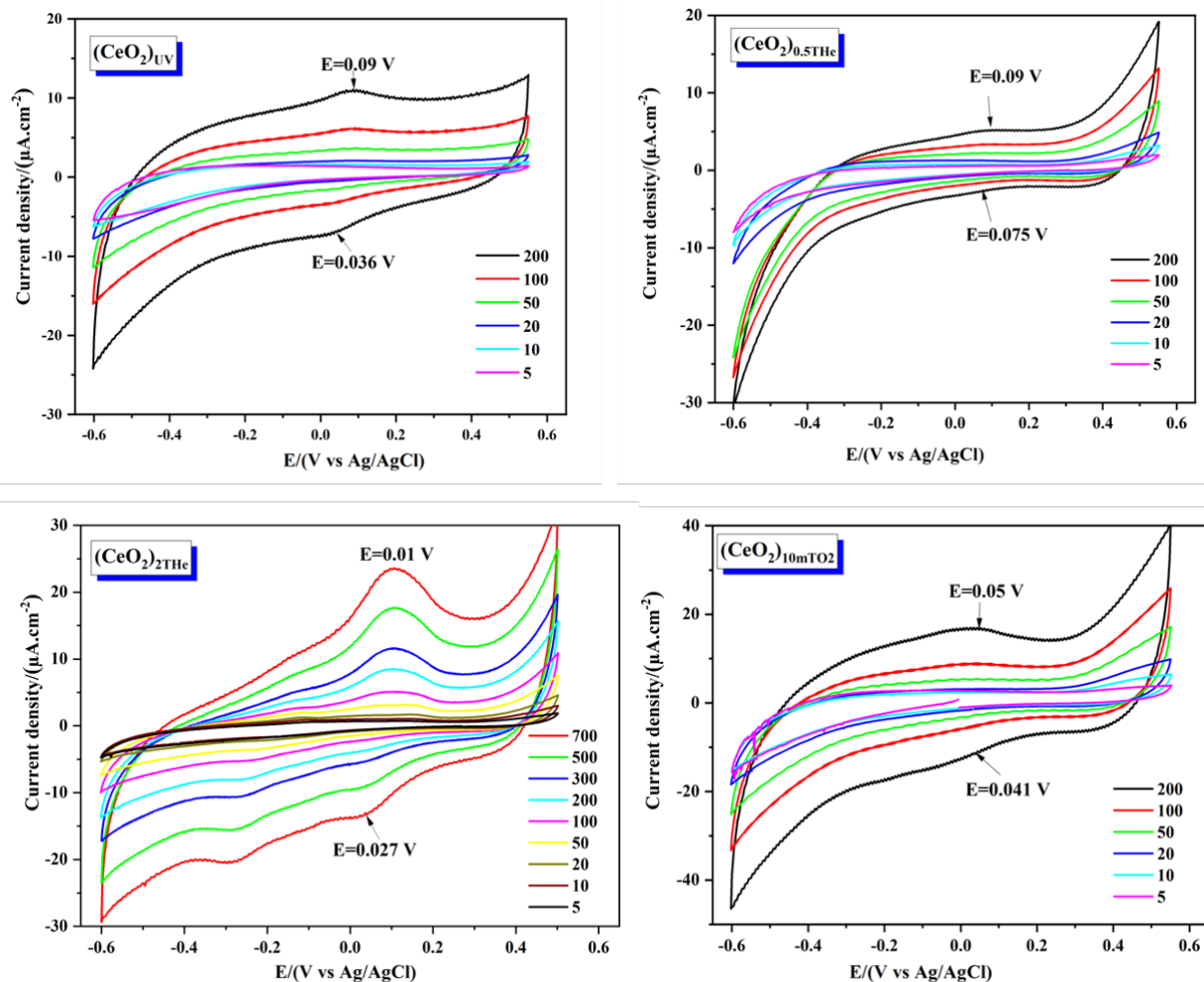


Figure S6 Cyclic voltammograms of CeO₂ electrodes recorded in PBS solution at different scan rates. Scan rates ($\text{mV}\cdot\text{s}^{-1}$) are visible in the legend. The CVs correspond to CeO₂ films deposited under different PLD atmospheres, as indicated in each graph.

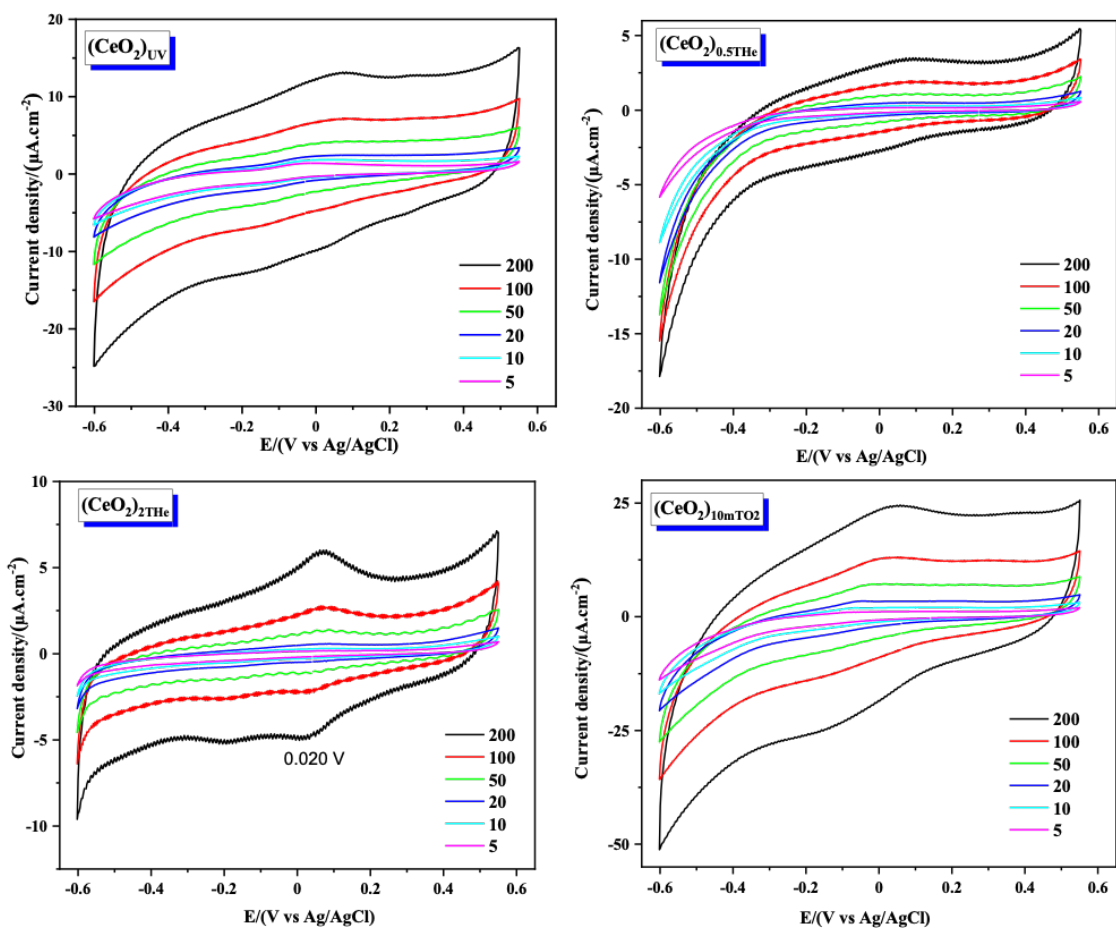


Figure S7 Cyclic voltammograms of CeO_2 electrodes recorded in PBS containing 4 mM glucose solution at different scan rates. Scan rates ($\text{mV}\cdot\text{s}^{-1}$) are visible in the legend. The CVs correspond to CeO_2 films deposited under different PLD atmospheres, as indicated in each graph.

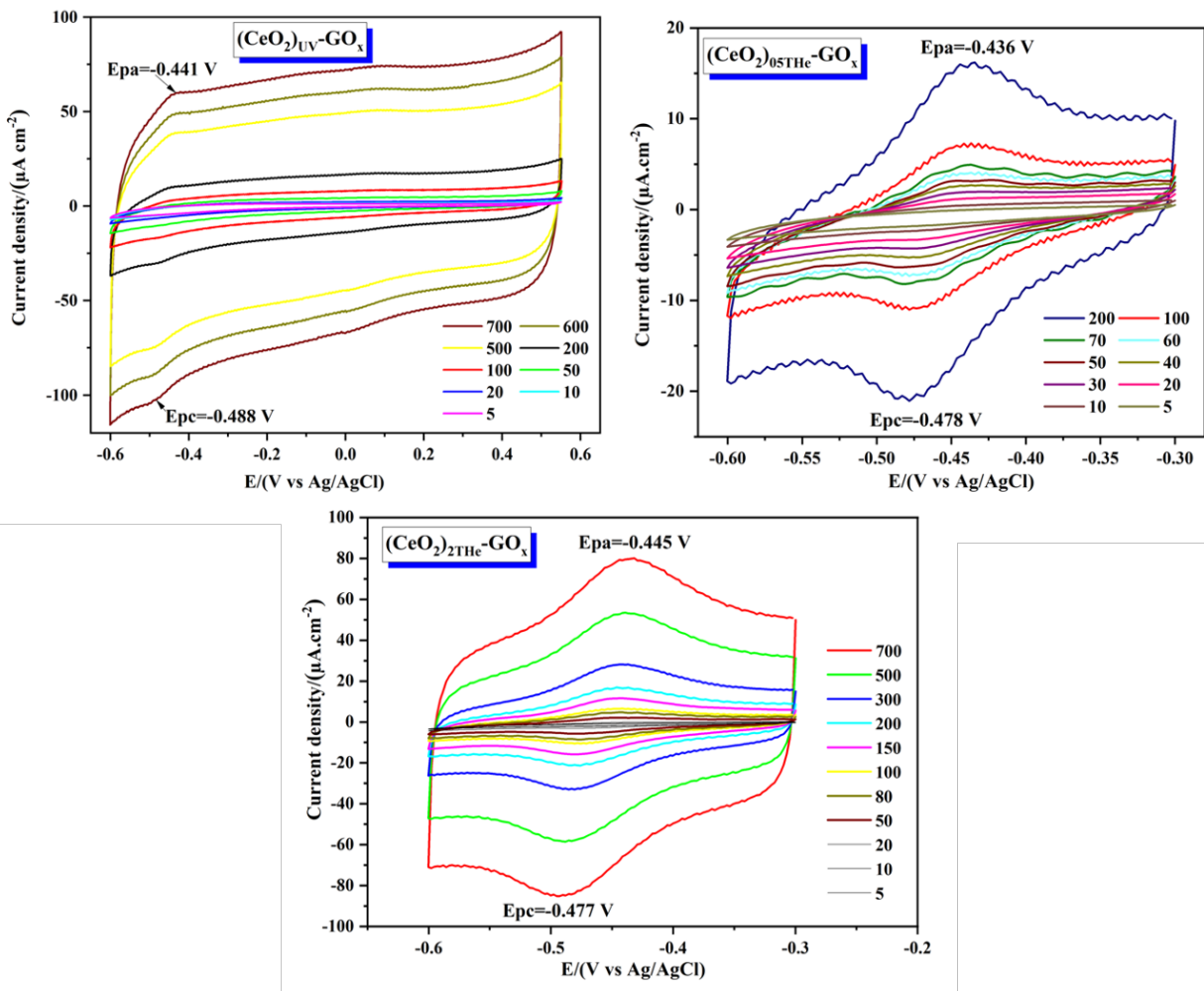


Figure S8 Cyclic voltammograms of CeO_2 -GOx electrodes recorded in PBS solution in the absence of glucose at varying scan rates. Scan rates (mV s^{-1}) are visible in the legend. The CVs correspond to CeO_2 films deposited under different PLD atmospheres, as indicated in each graph. Data for $(\text{CeO}_2)_{10\text{mTO}_2}\text{-GO}_x$ are not included due to data unavailability.

Table S1. Surface compositional parameters extracted from XPS analysis of PLD-grown CeO₂ films deposited under different background atmospheres. Ce³⁺/Ce⁴⁺ ratios and oxygen-related components were quantified from deconvolution of Ce 3d and O 1s spectra, respectively.

Samples	[Ce ³⁺]/[Ce] _{total}	[Ce ⁴⁺]/[Ce] _{total}	[Ce ³⁺]/[Ce ⁴⁺]	[O ²⁻]	[Ce]	[Ce]/[O ²⁻]
(CeO ₂) _{UV}	66.3	33.7	1.96	25.3	28.1	1.11
(CeO ₂) _{0.5THe}	70.1	29.9	2.34	8.00	15.8	1.97
(CeO ₂) _{2THe}	71.3	28.7	2.48	12.7	17.3	1.36
(CeO ₂) _{10mTO2}	56.6	43.4	1.30	21.3	35.8	1.68