

**Electronic supplementary materials**  
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**Coupling functional anodes with natural air-diffused cathodes enables highly efficient hydrogen peroxide electrosynthesis**

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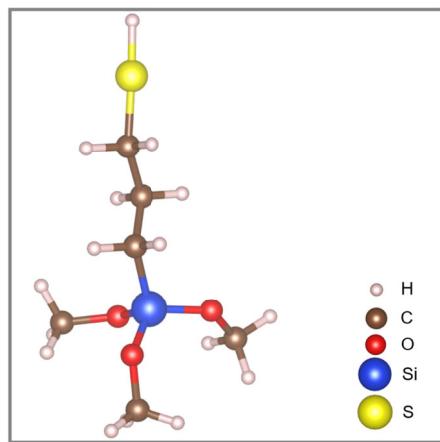


Fig. S1 The molecular structure of MPTMS.

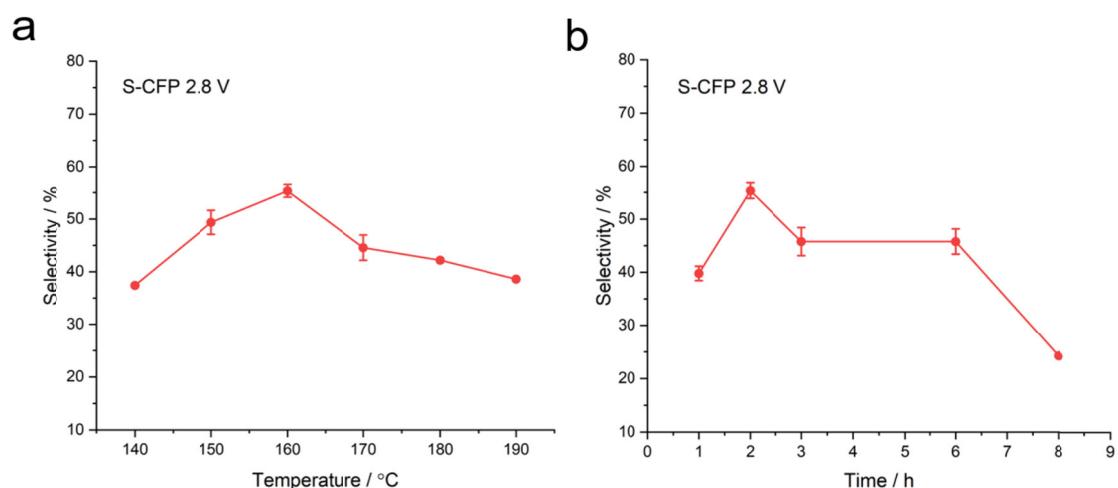


Fig. S2 Optimization of preparation conditions for S-CFP.

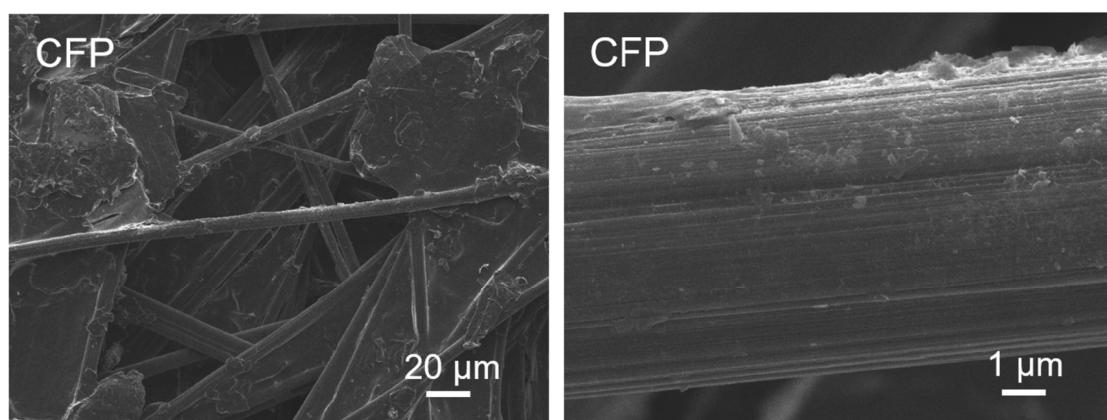


Fig. S3 SEM images of pristine CFP.

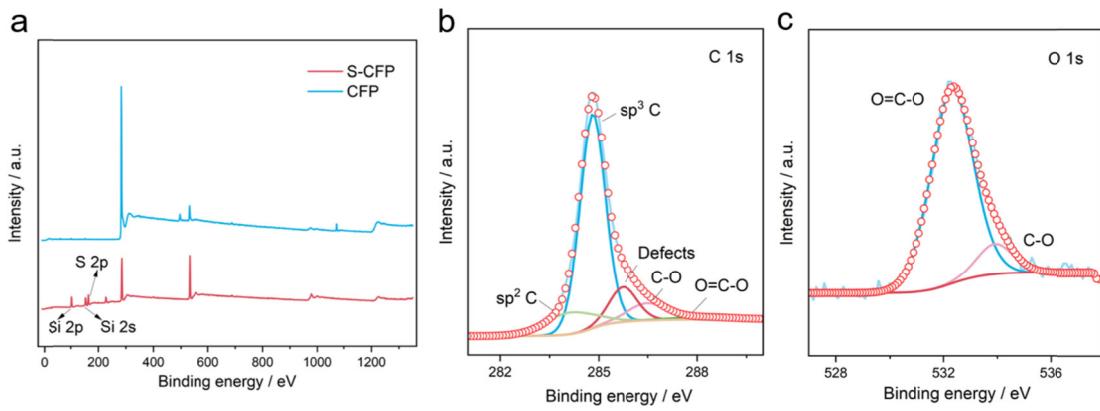


Fig. S4 XPS full spectra of S-CFP and pristine CFP. High-resolution C 1s (b) and O 1s (c) XPS spectra of pristine CFP.

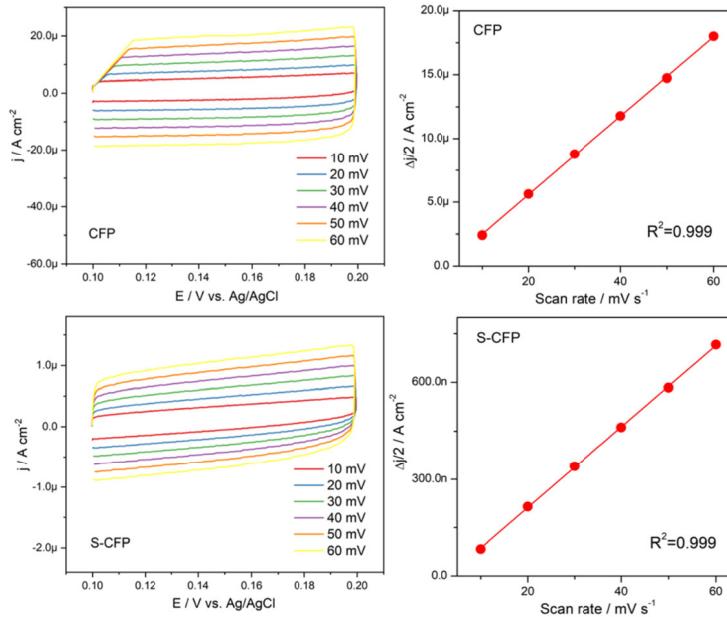


Fig. S5 Double-layer capacitance measurements for pristine CFP and S-CFP.

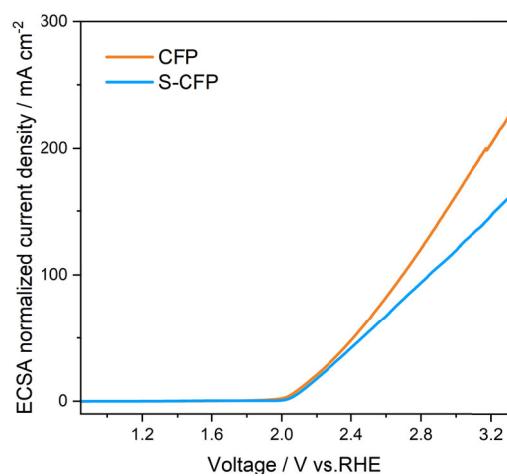


Fig. S6 Original LSV data of pristine CFP and S-CFP.

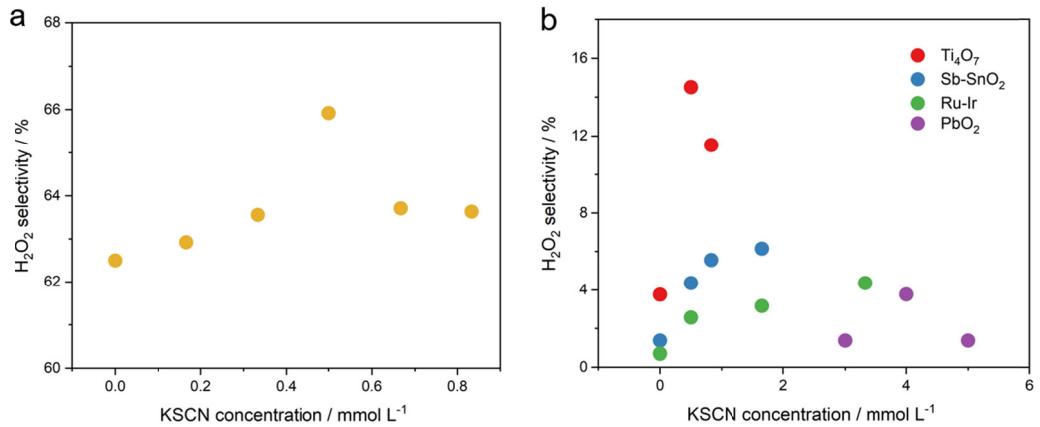


Fig. S7 Effect of KSCN on  $\text{H}_2\text{O}_2$  selectivity of S-CFP (a) and several titanium-based oxide electrodes (b).

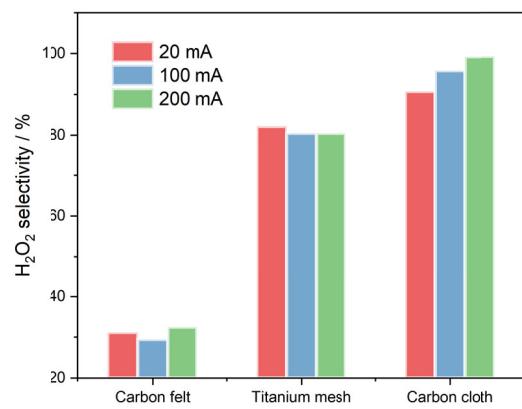


Fig. S8  $\text{H}_2\text{O}_2$  selectivity for NADE with different substrates.

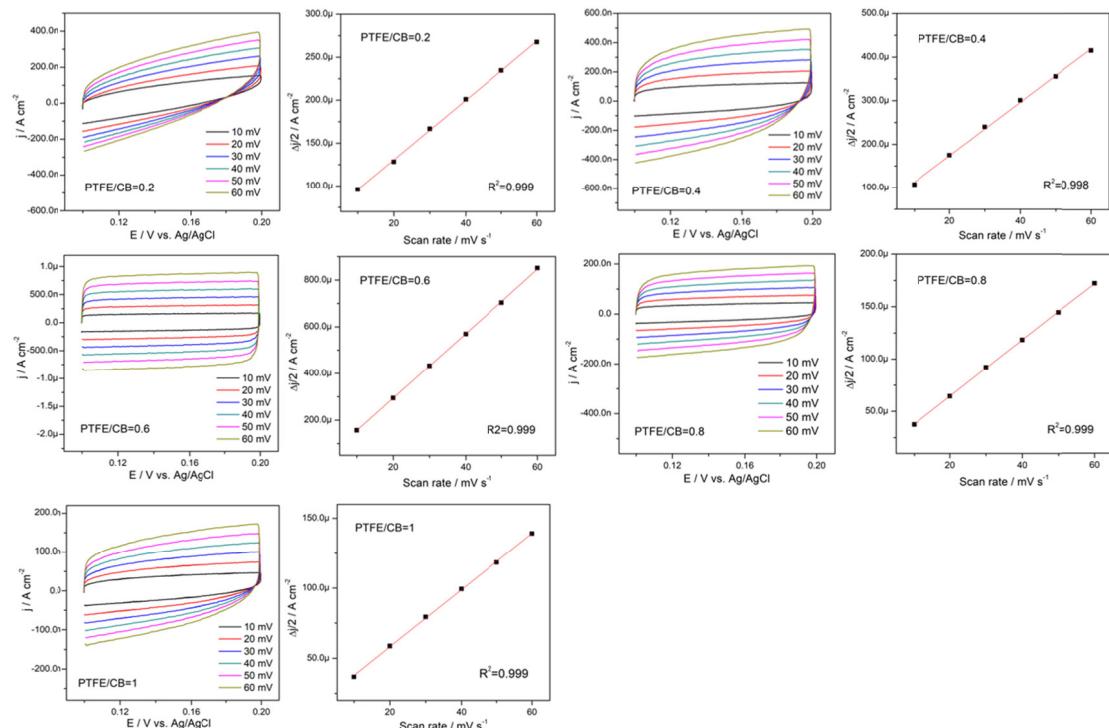


Fig. S9 Double-layer capacitance measurements for NADE with different PTFE/CB ratios.

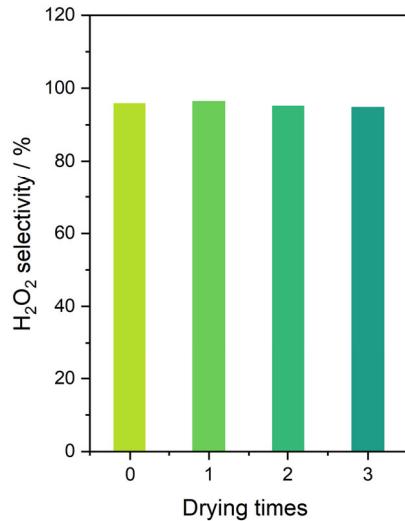


Fig. S10 H<sub>2</sub>O<sub>2</sub> selectivity at 100 mA cm<sup>-2</sup> for NADE after drying in an oven at 80 °C.