

Tailoring the Glucose Oxidation Activity of Anodized Copper Thin Films

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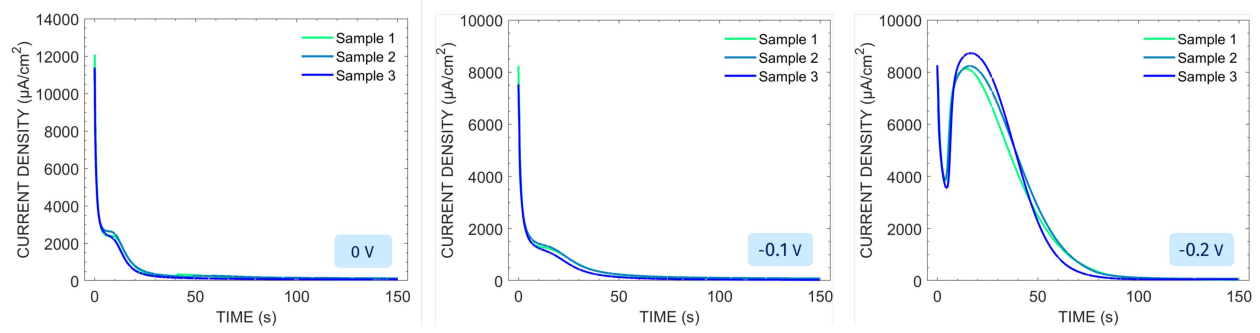
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Supporting Information Available



S 1: Reproducibility study of anodizations performed three times on different electrodes at 0V, -0.1V and -0.2V in 1 M KOH.

S Table 1: RF sputtering parameters for Cu on Pt films

Base Pressure: 2.5E-05 mBar				
Target	Time (min)	Power (W)	Working pressure (mBar)	Thickness (nm)
Ti	0.5	200	1.00E-02	10
Pt	7	100	1 E-02	300
Cu	5	200	1 E-02	300

S Table 2: XPS fitting parameters for SBare

Component	Position(eV)	FWHM(eV)	Lineshape	%Area
Cu(OH) ₂	934.57	2.95	GL(30)	0.00
Cu(OH) ₂	939.20	2.90	GL(30)	0.00
Cu(OH) ₂	942.10	2.80	GL(30)	0.00
Cu(OH) ₂	944.02	1.66	GL(30)	0.00
Cu 2+	933.21	2.11	GL(30)	27.85
Cu 2+	934.58	3.01	GL(30)	30.64
Cu 2+ (shakeup)	940.62	1.06	GL(30)	2.23
Cu 2+ (shakeup)	941.75	3.64	GL(30)	23.40
Cu 2+ (shakeup)	943.80	1.27	GL(30)	5.29
Cu 1+	932.27	1.10	GL(80)	10.55
Cu 0+	932.70	0.90	GL(90)	0.05

S Table 3: XPS fitting parameters for S0V

Component	Position(eV)	FWHM(eV)	Lineshape	%Area
Cu(OH) ₂	934.77	2.95	GL(30)	3.40
Cu(OH) ₂	939.40	2.70	GL(30)	0.34
Cu(OH) ₂	942.30	3.00	GL(30)	1.19
Cu(OH) ₂	944.22	1.66	GL(30)	0.31
Cu 2+	933.19	2.20	GL(30)	29.09
Cu 2+	934.56	3.15	GL(30)	32.00
Cu 2+ (shakeup)	940.60	1.09	GL(30)	2.33
Cu 2+ (shakeup)	941.73	3.65	GL(30)	24.44
Cu 2+ (shakeup)	943.78	1.26	GL(30)	5.53
Cu 1+	932.37	0.90	GL(80)	1.13
Cu 0+	932.53	0.70	GL(90)	0.26

S Table 4: XPS fitting parameters for S-0.1V

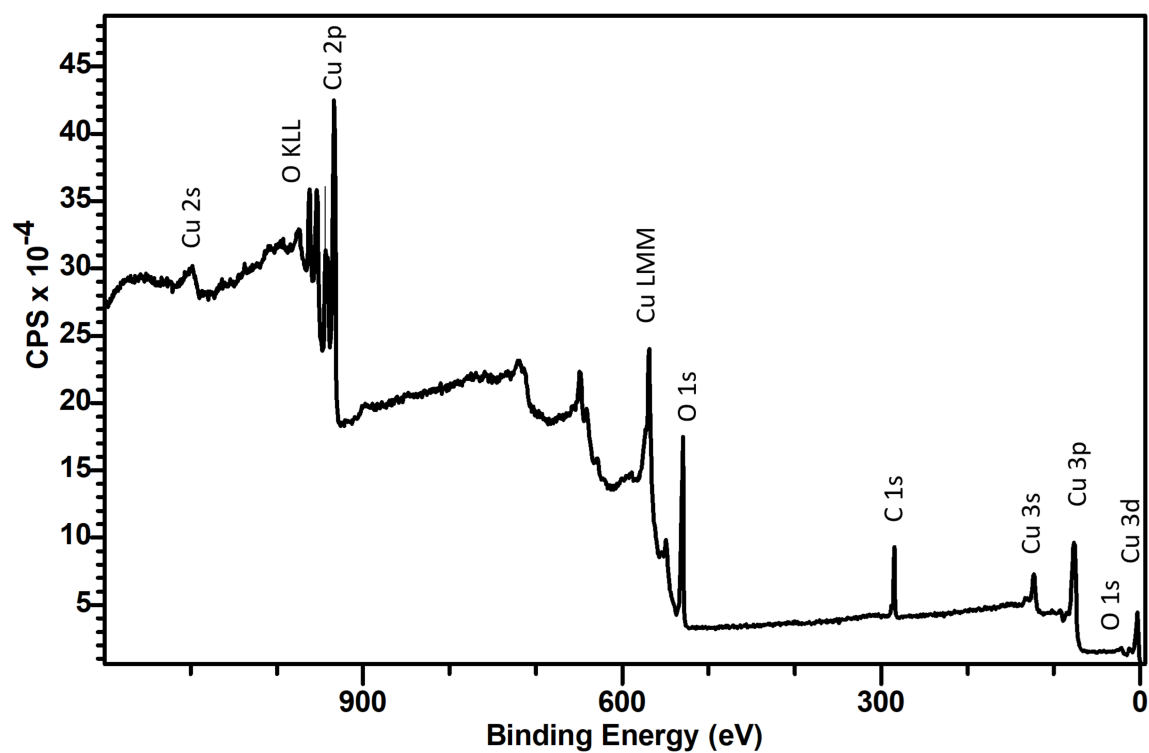
Component	Position(eV)	FWHM(eV)	Lineshape	%Area
Cu(OH) ₂	934.72	2.95	GL(30)	37.70
Cu(OH) ₂	939.35	2.70	GL(30)	3.77
Cu(OH) ₂	942.25	3.00	GL(30)	13.20
Cu(OH) ₂	944.17	1.66	GL(30)	3.39
Cu 2+	933.09	2.20	GL(30)	12.86
Cu 2+	934.46	3.15	GL(30)	14.15
Cu 2+ (shakeup)	940.50	1.13	GL(30)	1.03
Cu 2+ (shakeup)	941.63	3.65	GL(30)	10.80
Cu 2+ (shakeup)	943.68	1.27	GL(30)	2.44
Cu 1+	932.08	1.10	GL(80)	0.15
Cu 0+	932.73	0.90	GL(90)	0.51

S Table 5: XPS fitting parameters for S-0.2V

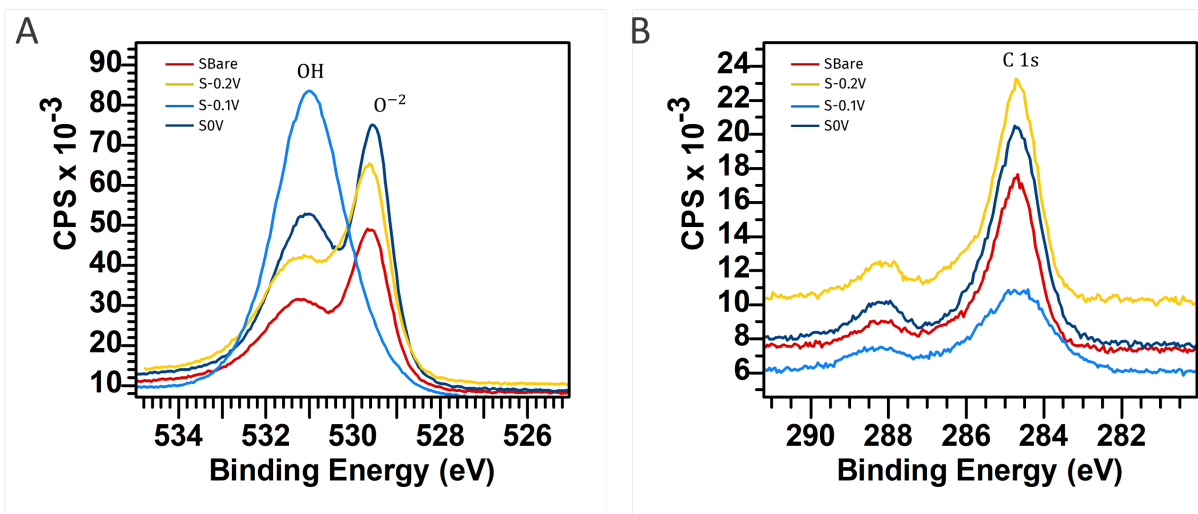
Component	Position(eV)	FWHM(eV)	Lineshape	%Area
Cu(OH) ₂	934.66	2.95	GL(30)	0.54
Cu(OH) ₂	939.29	2.90	GL(30)	0.05
Cu(OH) ₂	942.19	3.00	GL(30)	0.19
Cu(OH) ₂	944.11	1.66	GL(30)	0.05
Cu 2+	933.21	2.18	GL(30)	26.31
Cu 2+	934.58	2.95	GL(30)	28.94
Cu 2+ (shakeup)	940.62	1.05	GL(30)	2.10
Cu 2+ (shakeup)	941.75	3.65	GL(30)	22.10
Cu 2+ (shakeup)	943.80	1.27	GL(30)	5.00
Cu 1+	932.25	1.10	GL(80)	10.29
Cu 0+	932.53	0.80	GL(90)	4.42

S Table 6: Experimental data used to built a contour plot

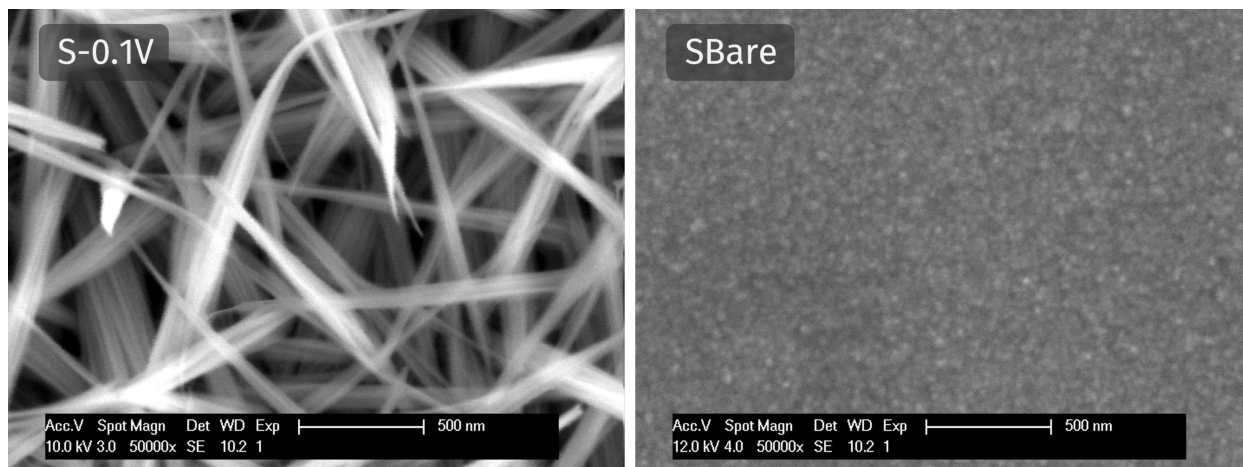
KOH (M)	Potential vs AgAgCl (V)	Peak current CV ($\mu\text{A}/\text{cm}^2$)
0.1	0.1	4816.71
0.1	-0.1	5804.63
0.1	-0.2	6260.65
0.1	0	7501.61
0.5	-0.1	5495.08
0.5	-0.2	5011.04
0.5	0	8034.39
0.75	-0.1	4624.61
0.75	-0.2	5153.31
0.75	0	7895.24
1	-0.1	7095.90
1	-0.2	6232.71
1	-0.3	6494.98
1	0	8270.49



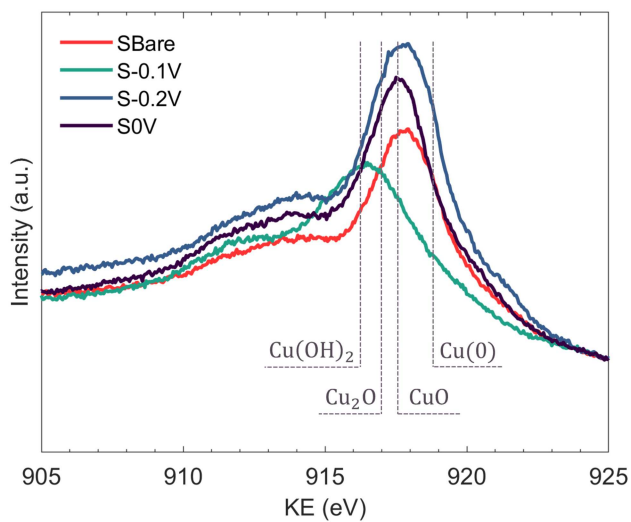
S 2: XPS survey spectrum of the fabricated bare copper electrode



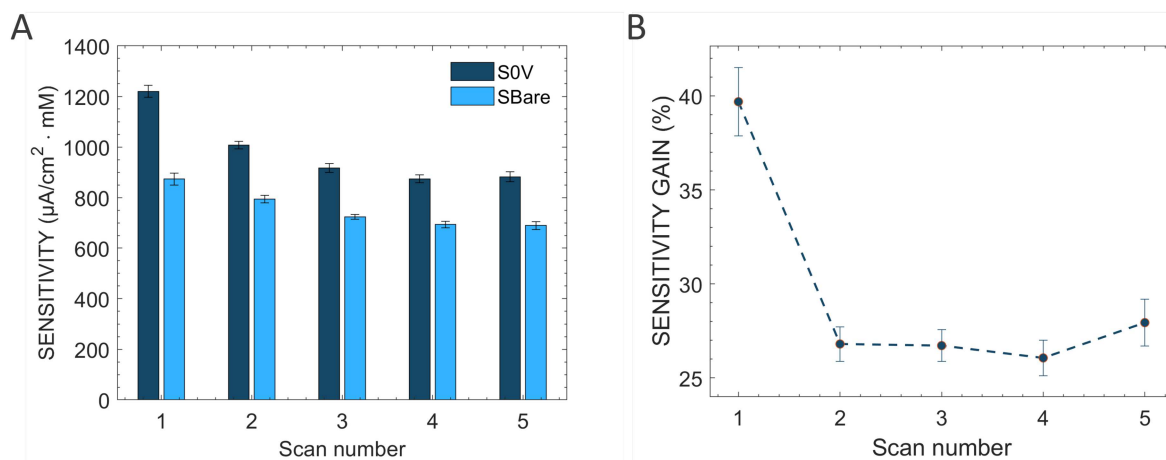
S 3: (A) O 1s XPS peaks for sample SBare, S0V, S-0.1V, S-0.2V.(B) C 1s XPS peaks for sample SBare, S0V, S-0.1V, S-0.2V



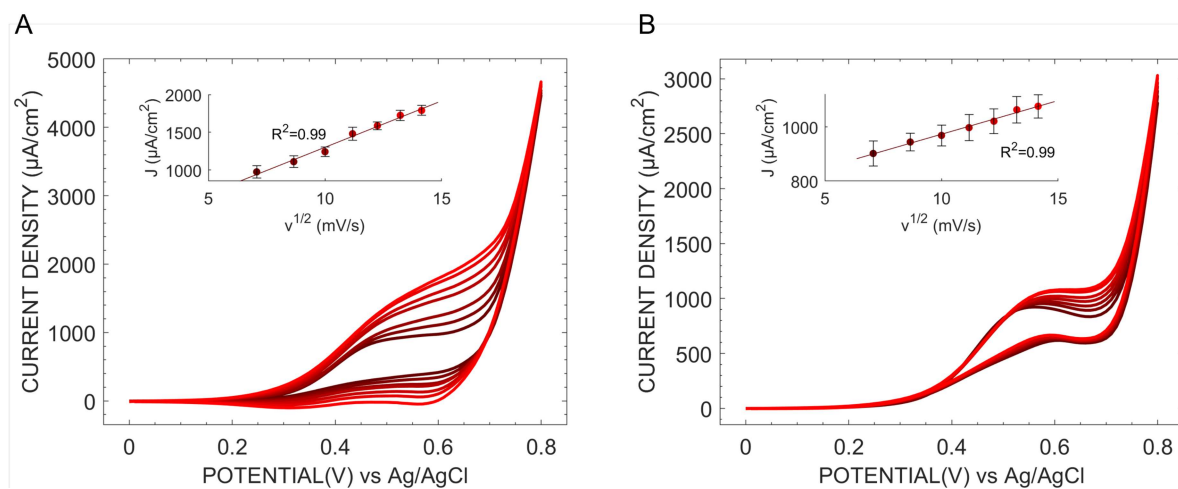
S 4: SEM images of S-0.1V (left) and SBare (right), with a magnification of 50kX



S 5: Cu L₃M₄₅M₄₅ Auger spectra of the samples anodized at various potentials



S 6: (A) Calculated sensitivity based on cyclic voltammetry of S0V and SBare as a function of the scan number. (B) Sensitivity gain of S0V compared to SBare as a function of the scan number



S 7: Scan rate study for a 0V anodized electrode (A) and the bare copper electrode (B). The third cycle is taken and the current densities at 0.6 V are considered. Glucose concentration: 2 mM