Supporting information

Detection of chlorinated organic pollutants with an integrated screen-printed electrochemical sensor based on a carbon nanocomposite derived from bread waste

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Table S1. The composition information of the bread provided by the supermarket.

net amount	210g
nutritional information	average values per 100g
energy value	1361kJ/321 kcal
fats	1g
saturated	0.30g
monounsaturated	0.12g
polyunsaturated	0.58g
carbohydrates	68g
sugars	0.68g
dietary fiber	2.7g
protein	8.6g
salt	0.05g

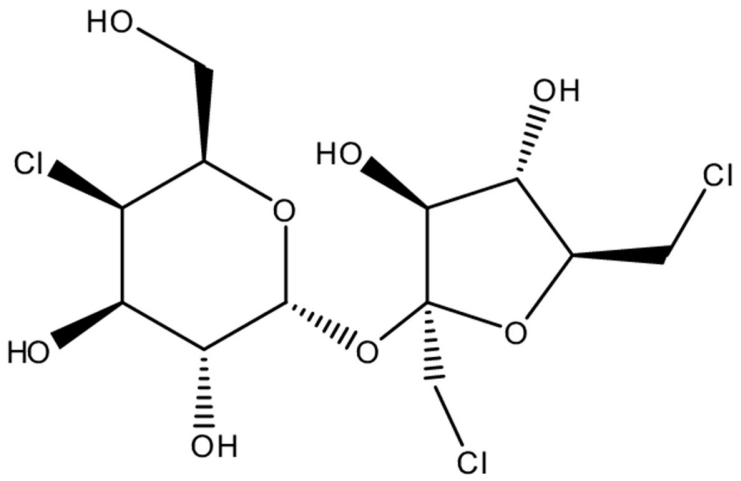

Figure S1. Chemical structure of sucralose.

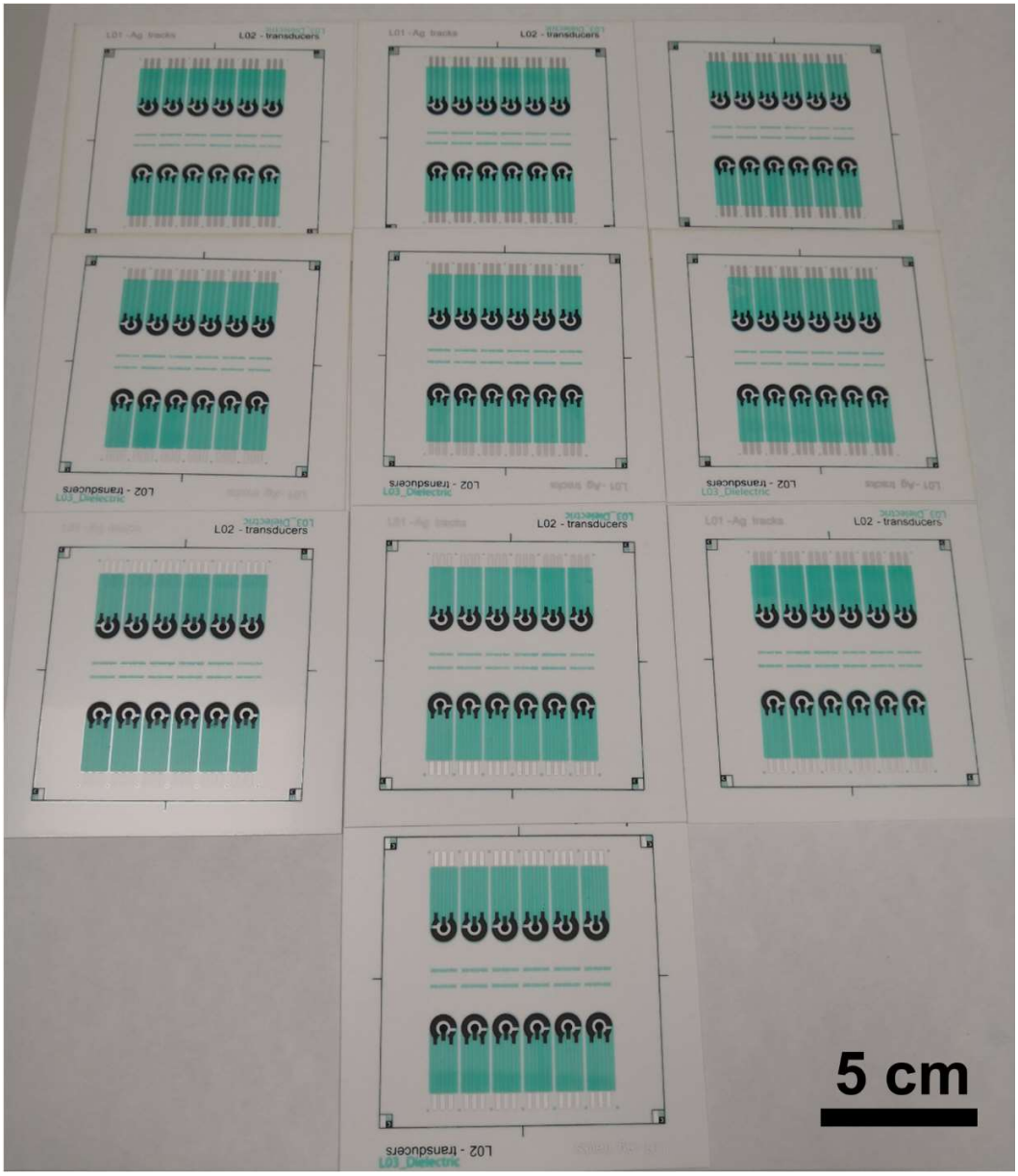

Figure S2. Optical image of the produced screen-printed electrodes.

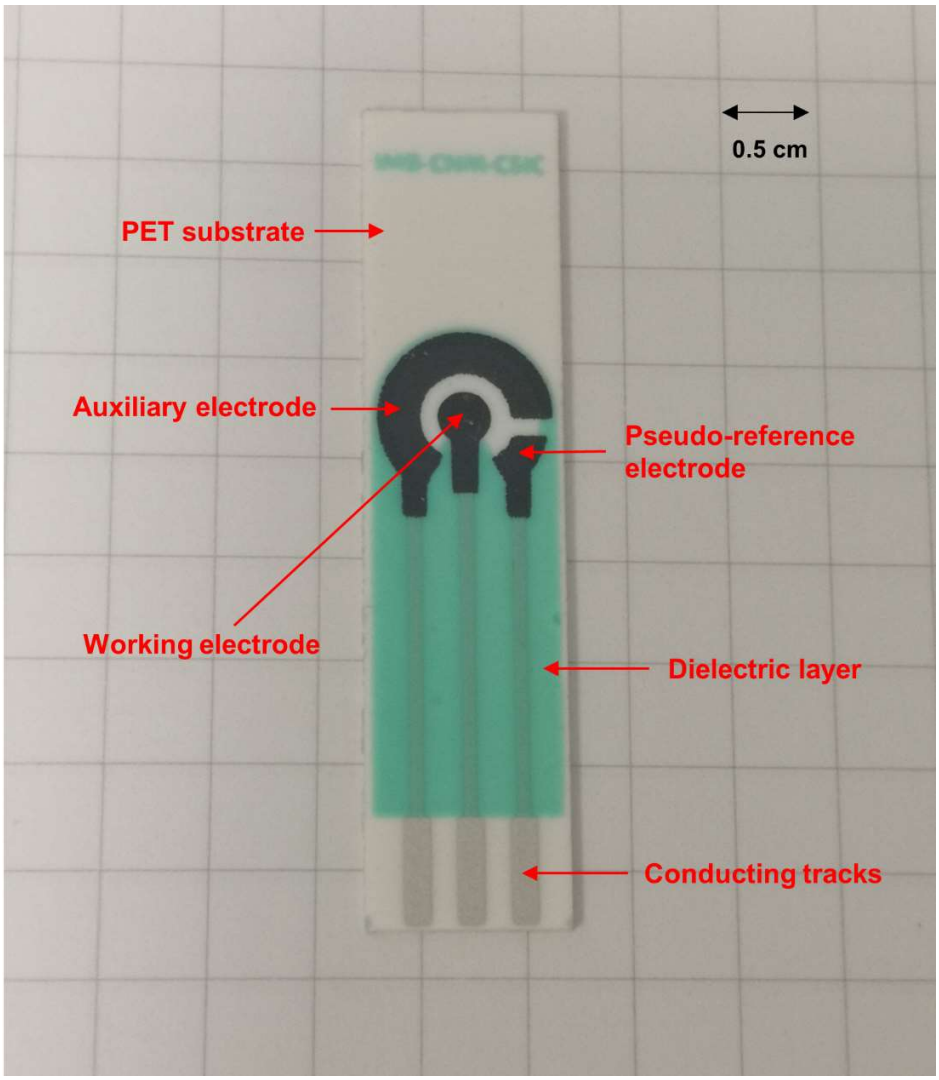

Figure S3. Optical image showing the different components of the screen-printed electrode.

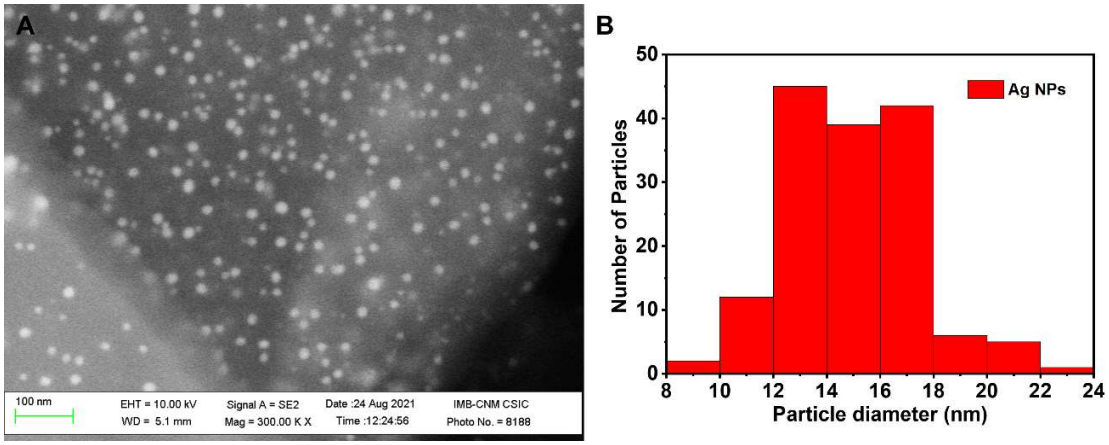

Figure S4. SEM images (A) and the Ag nanoparticles size distribution histogram (B) in Ag/C_SPE.

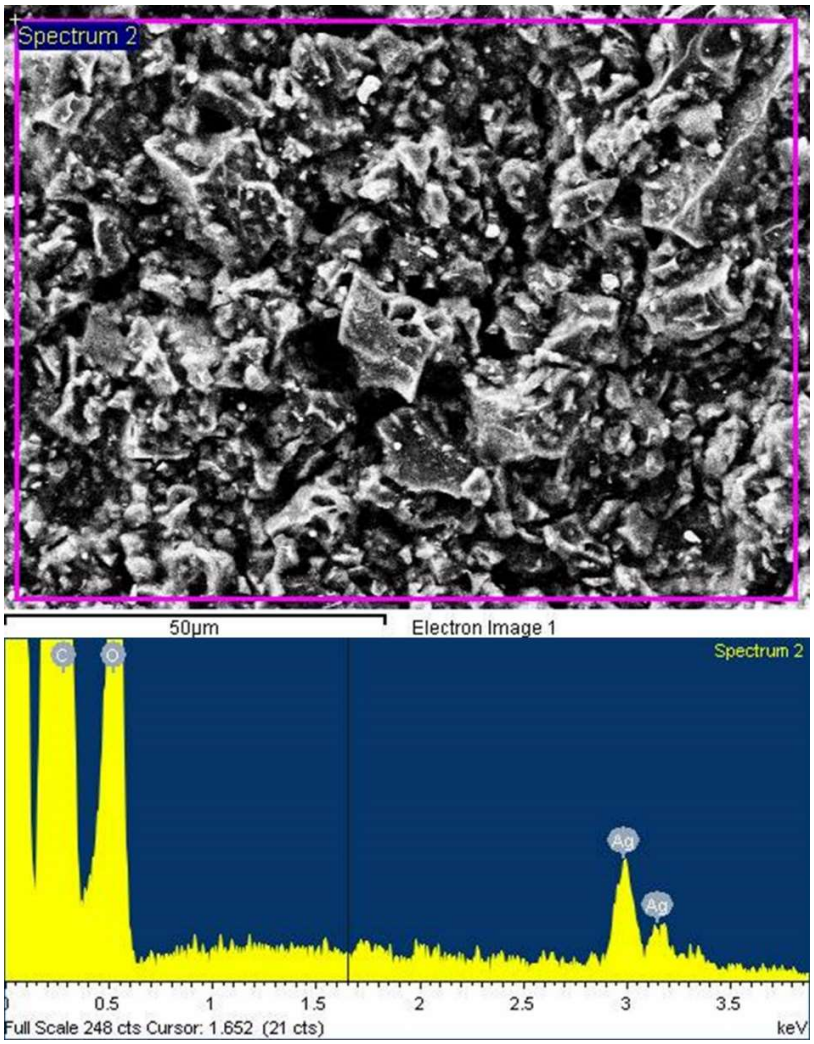

Figure S5. Energy dispersive X-ray spectroscopic (EDS) analysis, carried out to estimate the percentage of silver (Ag) and carbon (C) of the working electrode material.

element	Wt. %	At.%
C	55.1	67.27
Ag	10.79	1.47
O	34.11	31.27

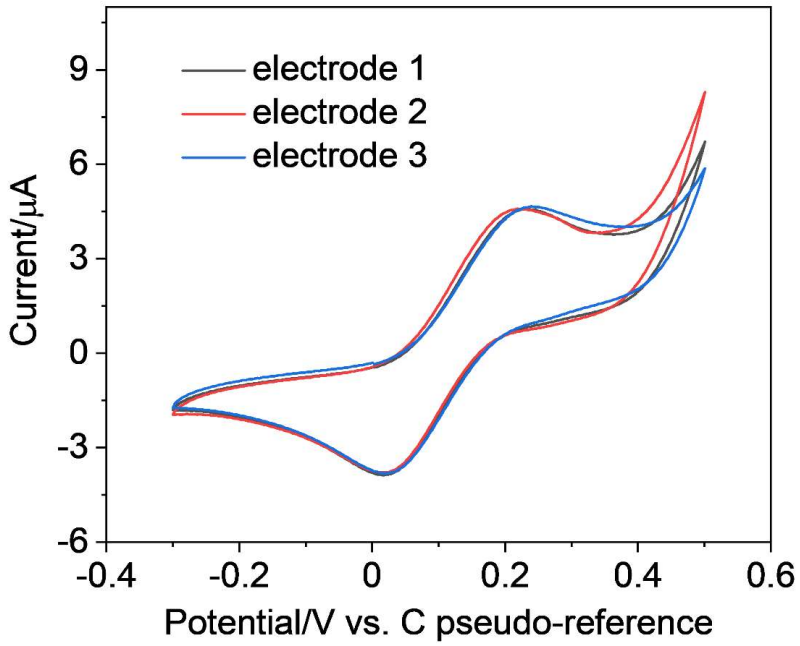

Figure S6. Cyclic voltammograms recorded in a 0.1M KNO_3 solution containing 1mM ferrocene- methanol using three different Ag/C_SPEs. The scan rate is 100 mV s^{-1}.

Table S2. Peak to peak separation and anodic to cathodic peak current ratio for different Ag/C screen-printed electrodes in a 0.1M KNO_3 solution containing 1mM ferrocene-methanol redox probe. The scan rate is 100 mV s^{-1}.

Electrodes	Peak to peak separation(mV)	Anodic peak current (µA)	Cathodic peak current (µA)	Anodic to cathodic peak current ratio
1	180	3.6	3.80	0.95
2	186	3.54	3.65	0.97
3	190	3.52	3.70	0.95
4	175	3.55	3.68	0.96
5	193	3.64	3.77	0.97
6	198	3.52	3.66	0.96
7	183	3.57	3.79	0.94
8	187	3.32	3.76	0.88
9	194	3.58	3.69	0.97
10	193	3.54	3.77	0.94
11	190	3.63	3.85	0.94
12	190	3.52	3.74	0.94
13	185	3.36	3.68	0.91
14	173	3.53	3.75	0.94
15	190	3.35	3.75	0.89
mean value	187	3.52	3.74	0.94
standard deviation	7	0.1	0.06	0.027
RSD	4%	3%	1.5%	2.8%

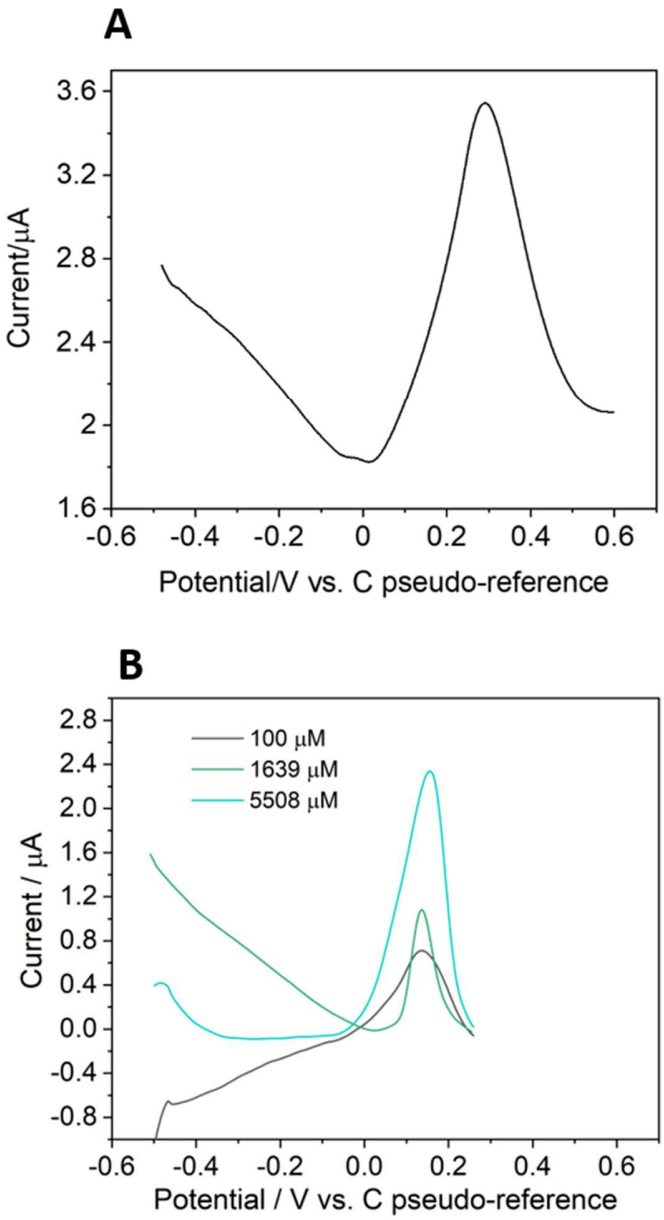

Figure S7. Square wave voltammograms recorded in PB solution (pH = 6.0) in the absence (A) and presence of different concentrations (B) of TCA.

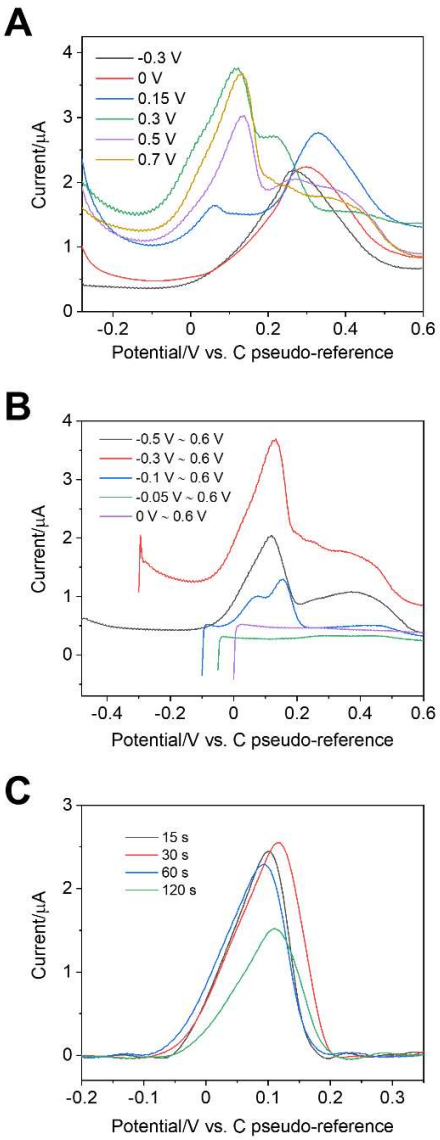

Figure S8. Optimization of the electrochemical condition for the measurement of TCA. (A) SWV curves recorded at different applied potentials. The scan range is -0.3 V – 0.6 V and the conditioning potential time is 15 s. (B) SWV curves recorded at different potential scan ranges. The applied conditioning potential is +0.5 V and the conditioning potential time is 15 s. (C) SWV curves recorded for different conditioning potential times. The applied conditioning potential is +0.5 V and the scan range is -0.5 V – 0.6 V. The concentration of TCA is 500 μM. The SWV parameters were 5 mV step, 25 mV amplitude and 20 Hz frequency.

Table S3. Analytical parameters of the developed sensors for TCA determination.

Modified electrodes	Linear range (μM)	LOD (μM)	Ref.
Ag NPs-MA/GCE (SWV)	0.1-2, 4-100	0.030, 0.079	1
Hg-Ag@GNR-PSS-PDDA/GCE (CA)	0.16-1.7	0.12	2
Porphyrin/SWNTs-[BMIM][PF_6]/GCE (CA)	0.9-140	0.38	3
SNP-CS/GCE (CA)	3-56	1.1	4
Ag-MWCNT/GCE (SWV)	5-120	1.9	5
MWCNTs/Pc/Fe(CA)	8-2000	2.0	6
TH/TNTs/CS/GCE (CV)	15-1500	-	7
np-Ag (CA)	2500-22500	25.4	8
Ag/C_SPE (SWV)	100-5508	19.8	This work
Ag/C_SPE_paper (SWV)	100-4295	23.8	

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