Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Electronic Supplementary Information (ESI)

Electrochemical oxidation of Diclofenac on CNT and M/CNT modified electrodes

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Table S1. Maximum current densities and oxidation potentials for CNT, Pt/CNT and Ru/CNT modified electrodes in different supporting electrolytes.

		Peak A		Peak B		Peak C	
Electrode	**Supporting electrolyte**	Ep(ox) (V/SCE)	J(ox)/mA.mg^{-1})	Ep(ox) (V/SCE)	J(ox)/mA.mg^{-1})	Ep(ox) (V/SCE)	J(ox)/mA.mg^{-1})
CNT	**NaOH (0.5M)**	-0.07	10.23	0.17	4.18	----	----
	$NaHCO_3/Na_2CO_3$ buffer	-0.11	3.06	0.23	3.86	0.64	2.88
Pt/CNT	**NaOH (0.5M)**	-0.03	3.50	0.21	3.95	----	----
	$NaHCO_3/Na_2CO_3$ buffer	0.01	2.62	0.32	3.06	0.56	4.79
	NaCl (0.1M)/phosphate buffer	0.31	4.55	0.81	2.37	----	----
Ru/CNT	**NaOH (0.5M)**	-0.09	7.48	0.16	4.04	----	----
	$NaHCO_3/Na_2CO_3$ buffer	-0.02	2.77	0.498	2.60	0.695	2.04
	NaCl (0.1M)/phosphate buffer	0.16	5.21	0.30	5.41	0.66	4.26

Table S2. Kinetic parameters of the oxidation reaction of DCF in 0.5 M NaOH, 0.1 M carbonate buffer and 0.1 M NaCl/phosphate buffer, on CNT, Pt/CNT and Ru/CNT modified electrodes.

		Peak A			Peak B			Peak C		
Electrode	**Supporting electrolyte**	Sweep rate range (mV s^{-1})	Slope	Limiting step	Sweep rate range (mV s^{-1})	Slope	Limiting step	Sweep rate range (mV s^{-1})	Slope	Limiting step
Pt/CNT	**NaOH (0.5M)**	10 to 250	0.68	mixed	10 to 250	0.50	diffusion			
Ru/CNT	**NaOH (0.5M)**	10 to 500	0.75	mixed	10 to 250	0.73	mixed		----	
Pt/CNT	**$NaHCO_3/Na_2CO_3$ buffer**	10 to 200	0.75	mixed		----		10 to 250	0.70	mixed
Ru/CNT	**$NaHCO_3/Na_2CO_3$ buffer**	10 to 100	1.04	adsorption	10 to 50	0.55	diffusion	20 to 250	0.90	adsorption
Pt/CNT	**NaCl (0.1M)/phosphate buffer**	10 to 250	0.95	adsorption	10 to 200	0.60	diffusion		----	
Ru/CNT	**NaCl (0.1M)/phosphate buffer**	10 to 150	0.49	diffusion	10 to 250	0.76	mixed	10 to 150	0.61	diffusion

Table S3. The comparison of the published studies on DCF electrooxidation.

Working electrode	Area (cm^2)	Supporting electrolyte	[DCF] (mg/L)	Time (h)	R (%)	Ref.
BDD[a]	12	0.1 M Na_2SO_4	30	4	72[b]	55
Ti/Pt	2	0.5 M Na_2SO_4	200	5	70	56
BDD[a]	2	0.5 M Na_2SO_4	200	5	100	56
Ti/SnO_2-Sb	2	0.5 M Na_2SO_4	200	5	83	56
Ti/SnO_2-Sb-Pt(3%)[c]	2	0.5 M Na_2SO_4	200	5	90	56
Ti/SnO_2-Sb-Pt(13%)[c]	2	0.5 M Na_2SO_4	200	5	91	56
PC	1	0.05 M Na_2SO_4	20-200	1	38	57
rGO-PC	1	0.05 M Na_2SO_4	20-200	1	72	57
Cu-PC	1	0.05 M Na_2SO_4	20-200	1	87	57
Cu-PC-rGO	1	0.05 M Na_2SO_4	20-200	1	100	57
carbon brush[e]		0.05 M Na_2SO_4, $FeSO_4$	0.04	5	97	58
Ti-RuO_2[f]		0.05 M Na_2SO_4, MSWCNTs[f]	10	2	100[g]	59
Ti-RuO_2[f]		0.05 M Na_2SO_4, MSWCNTs[f]	10	2	~80[h]	59
Ti-RuO_2[f]		0.05 M Na_2SO_4, MSWCNTs[f]	10	2	~70[i]	59
Ti-RuO_2[f]		0.05 M Na_2SO_4, MSWCNTs[f]	10	2	~60[j]	59
Ti-RuO_2[f]		0.05 M Na_2SO_4, MSWCNTs[f]	10	2	~40[k]	59
CNT	4	0.1 M NaOH	592	8	27	This work
Pt-CNT	4	0.1 M NaOH	592	8	38	This work
Ru-CNT	4	0.1 M NaOH	592	8	23	This work
CNT	4	0.1 M Na_2CO_3/$NaHCO_3$	592	6	42	This work
Pt-CNT	4	0.1 M Na_2CO_3/$NaHCO_3$	592	6	46	This work
Ru-CNT	4	0.1 M Na_2CO_3/$NaHCO_3$	296	6	88	This work

[a] Boron doped diamond, [b] DCF removal based on TOC, [c] Pt-doped SnO_2-Sb electrode, [d] Cu-rGO-PC - carbon film-supported Cu-rGO electrode (the carbon film prepared post carbonization of the polymeric film is abbreviated as "PC" and rGO- reduced graphene oxide), [e] bio-electro-Fenton process, (working electrode diameter 5.9 cm, length 6.9 cm), [f] heterogeneous electro-Fenton process, MSWCNTs - magnetic single-walled carbon nanotubes, c= 60 mg/L , [g] pH=4-5, [h] pH=6, [i] pH=7, [j] pH= 8-9, [k] pH=10

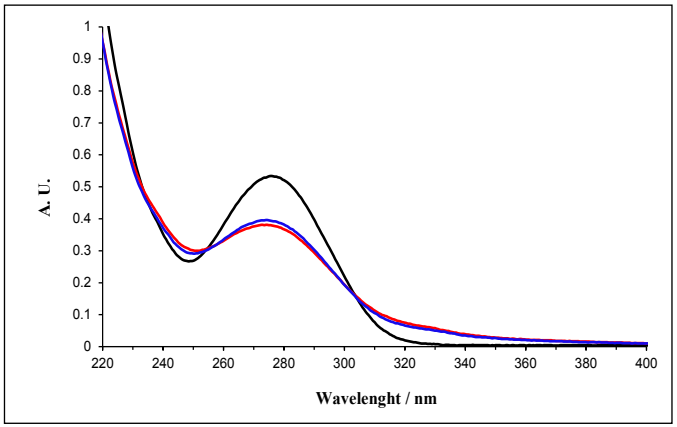

Figure S1. UV spectra of DCF standard solution (—) and electrolyzed solutions of DCF (t = 8 h of electrolysis) at Pt/CNT (—) and at Ru/CNT (—) modified electrodes, in 0.1 M NaOH medium.

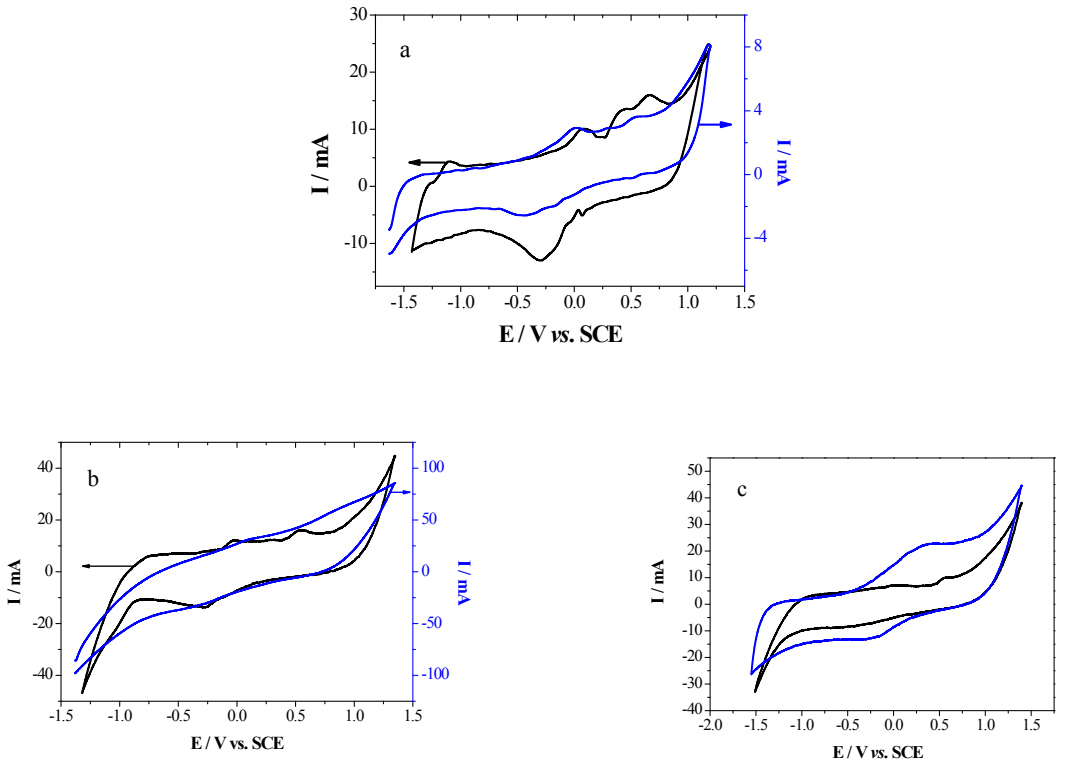

Figure S2. Cyclic voltammograms of a) CNT, b) Pt/CNT and c) Ru/CNT, (—) at the beginning and (—) at the end of the electrolysis of 2 mM DCF (at CNT and Pt/CNT modified electrodes) and 1 mM DCF (at Ru/CNT modified electrode).