Supporting information

Electrochemical degradation of perfluorinated compounds by Ag coated Ti (Ti/Ag) anode: Toward the electrode preparation, characterization and application

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This Supporting material contains the detailed information including 3 tables and 9 figures that are presented as follows.

Table S1

BBD experimental design matrix along with the experimental response.

Factor	Symbol	Unit	Level		
			-1 (Low)	0 (Central)	+1 (High)
pH	X_1	/	4	7	10
Current density	X_2	mA/cm^2	5	15	25
Distance	X_3	mm	8	16	24
Electrolysis time	X_4	min	30	75	120

Run	Factor				Actual value	Predicted value
	X_1	X_2	X_3	X_4	(%)	(%)
1	7	5	24	75	50.6	53.68
2	4	15	16	30	33.2	35.15
3	7	15	24	30	32.8	33.67
4	7	15	24	120	80.0	77.22
5	10	15	8	75	69.6	68.63
6	7	5	8	75	51.2	54.03
7	10	15	24	75	68.3	68.32
8	4	5	16	75	54.6	56.16
9	4	15	8	75	77.4	75.32
10	7	5	16	30	28.1	21.71
11	7	15	16	75	74.9	74.90
12	7	25	16	30	34.8	34.89
13	4	25	16	75	78.9	77.19
14	10	5	16	75	48.7	49.76
15	7	25	8	75	79.0	78.62
16	7	25	24	75	74.6	74.47
17	7	15	8	30	33.9	36.02
18	7	15	16	75	74.9	74.90
19	7	15	16	75	74.9	74.90
20	10	15	16	120	73.1	73.85
21	10	25	16	75	76.3	74.09
22	7	5	16	120	57.8	55.66

23	4	15	24	75	72.2	71.13
24	7	15	8	120	80.9	79.38
25	7	15	16	75	74.9	74.90
26	4	15	16	120	79.6	80.95
27	10	15	16	30	31.4	32.75
28	7	25	16	120	83.5	87.84
29	7	15	16	75	74.9	74.90

Table S2

ANOVA table for model to predict PFCs% removal by Ti/Ag anode using BBD.

Source of variation	Sum of squares	Df[#]	Mean square	F-Value	P-value
Model	9429.77	14	673.555	76.62016	< 0.001
X_1	67.6875	1	67.6875	7.699782	0.01490
X_2 (Significant)	1543.601	1	1543.601	175.5921	< 0.001
X_3	15.1875	1	15.1875	1.727652	0.20983
X_4 (Significant)	5663.708	1	5663.708	644.2742	< 0.001
X_1X_2	2.7225	1	2.7225	0.309698	0.58665
X_1X_3	3.8025	1	3.8025	0.432553	0.52140
X_1X_4	5.5225	1	5.5225	0.628211	0.44123
X_2X_3	3.61	1	3.61	0.410655	0.53198
X_2X_4	90.25	1	90.25	10.26638	0.00636
X_3X_4	0.01	1	0.01	0.001138	0.97357
X_1^2	39.73378	1	39.73378	4.519911	0.05177
X_2^2	428.2095	1	428.2095	48.71091	< 0.001
X_3^2	16.09054	1	16.09054	1.830377	0.19752
X_4^2	1819.865	1	1819.865	207.0185	< 0.001
Residual	123.0717	14	8.790833		
Lack of Fit	123.0717	10	12.30717		
Pure Error	0	4	0		
Cor Total	9552.842	28			

[#]: Degree of freedom.

Table S3

Quality of the quadratic model based on R^2 and the standard deviation for the PFCs removal

Quadratic Summary Statistics	
Responce	P% (PFCs removal)
Standard Deviation (S.D.)	2.96
Coefficient of Variation (CV%)	4.71
Mean	62.93
Predicted residual error sum of squares	708.89
Pred R-Squared (R^2_{Pred})	0.9258
Adj R-Squared (R^2_{Adj})	0.9742
R-Squared (R^2)	0.9897
Adequate precision (AP)	31.014

Figure:

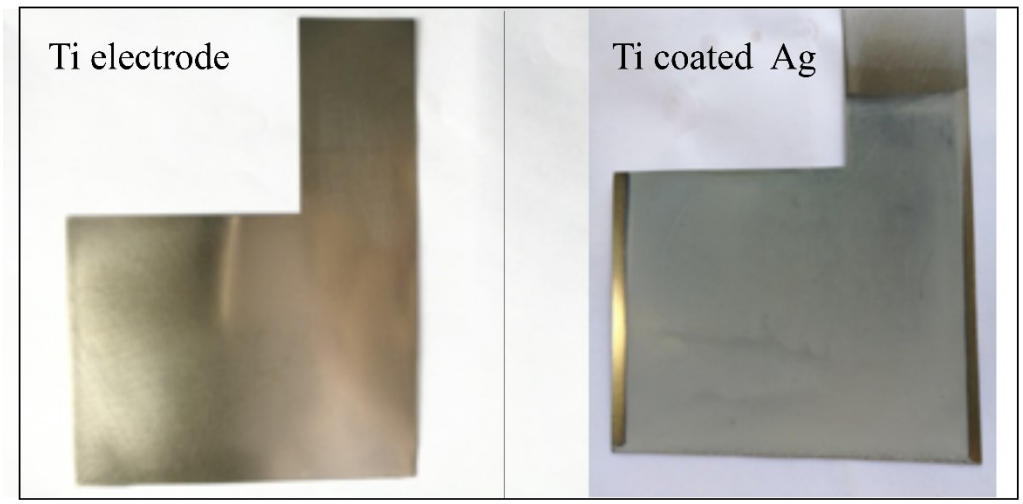

Figure S1. Physical drawings of Ti and Ti/Ag electrodes

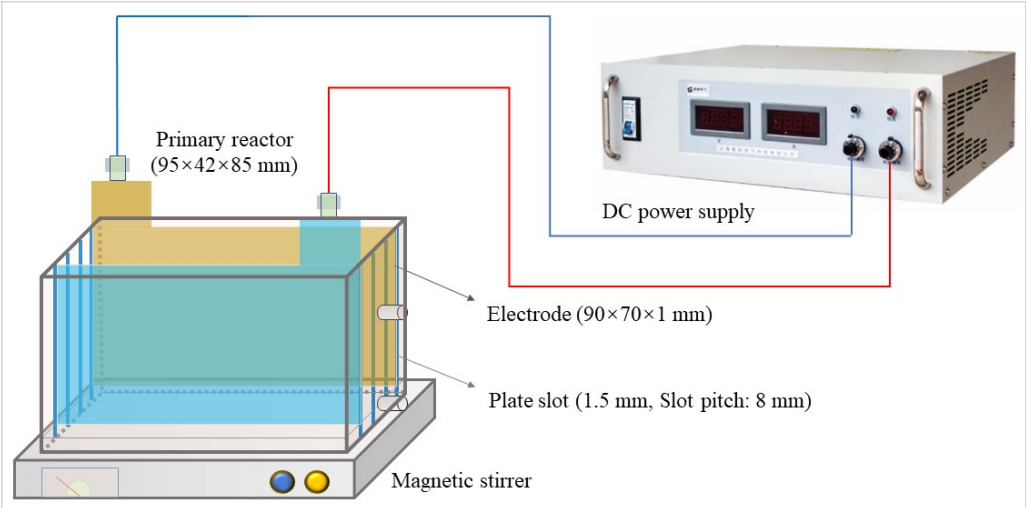

Figure S2. Schematic diagram of electrochemical oxidation reaction device

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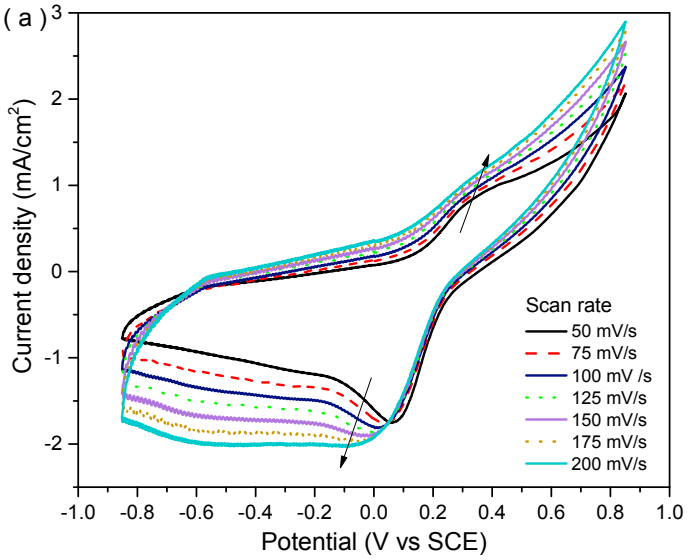

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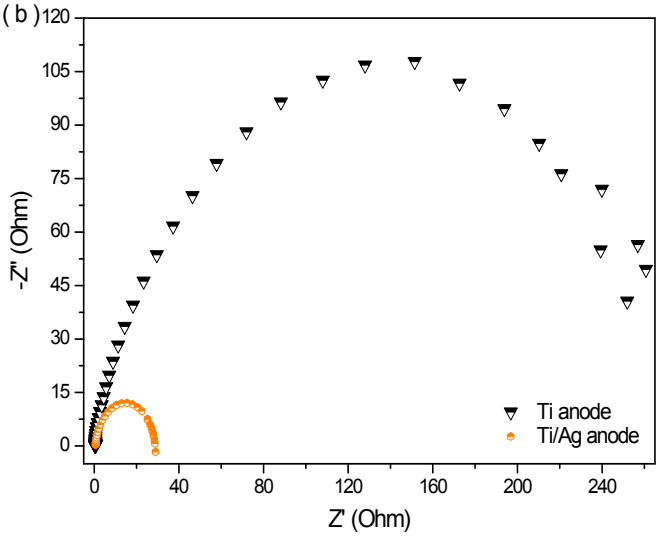

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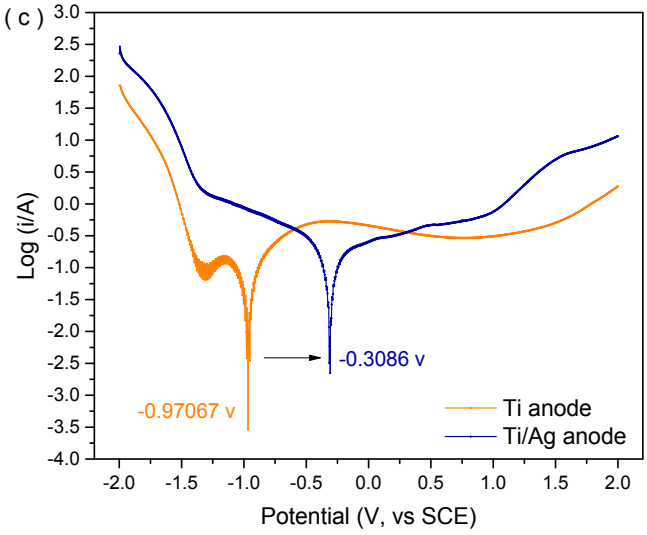


46 **Figure S3.** Cyclic voltammetry (a), Electrochemical impedance spectroscopy (b) and

47 Tafel (c) of Ti/Ag anode analysis (vs. SCE)

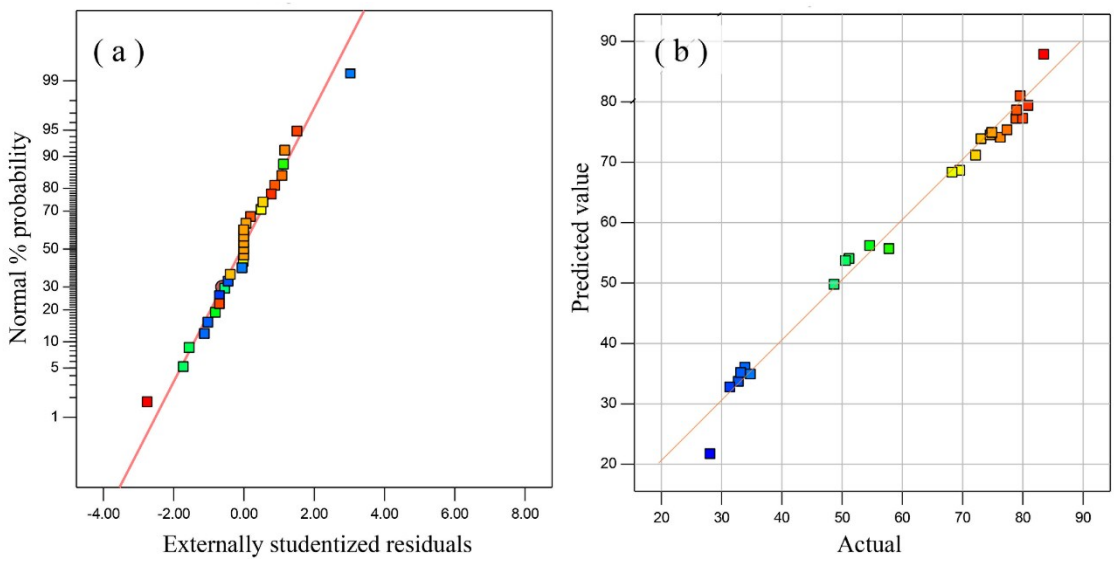


Figure S4. PFCs removal of the diagnostic plots on model reliability (a), and correlation for actual and predicted value (b).

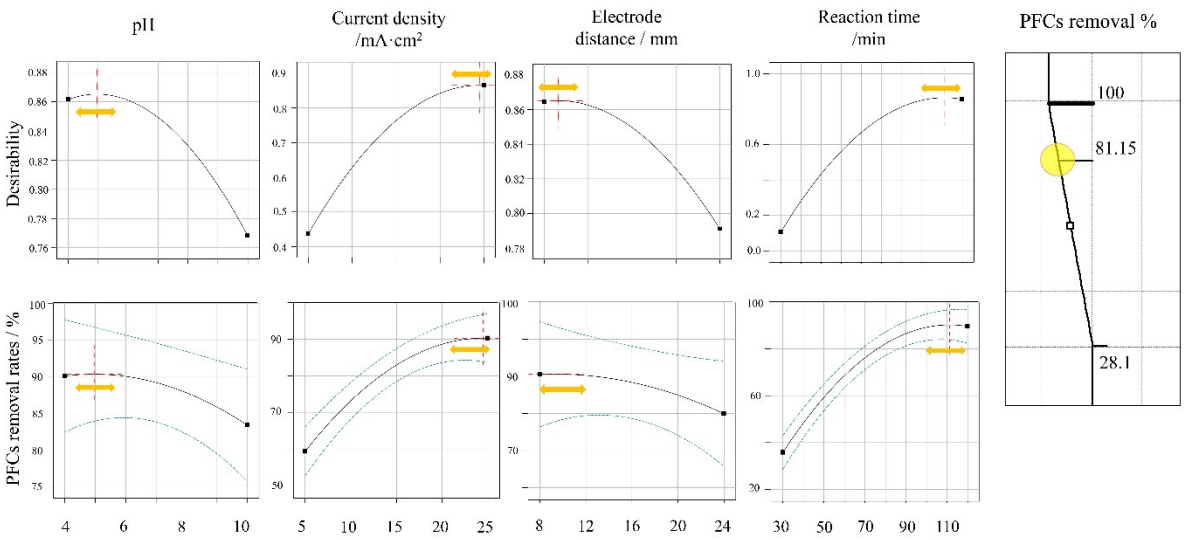


Figure S5. Profiles of desirability functions and predicated values Profile for removal rates of PFCs

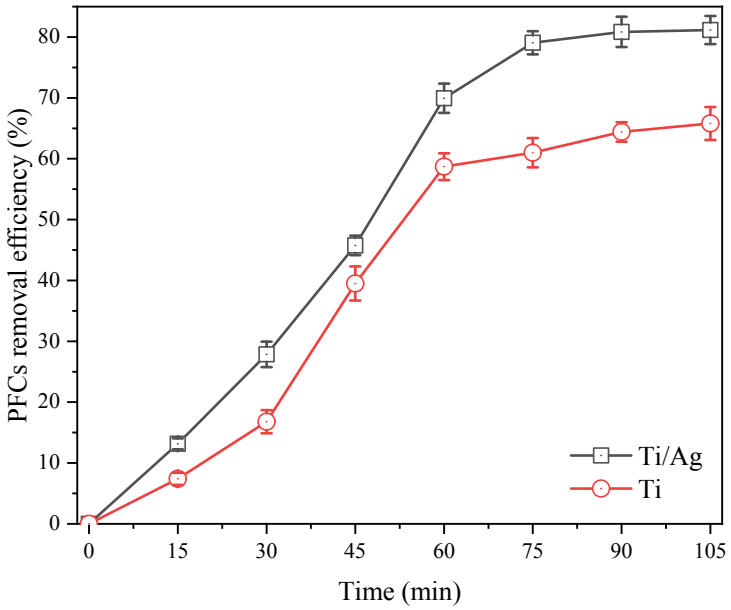


Figure S6. Removal efficiency of PFCs by Ti and Ti/Ag electrodes under optimal parameters (pH: 6, current density 20: mA/cm^2, electrode distance: 1.6 cm)

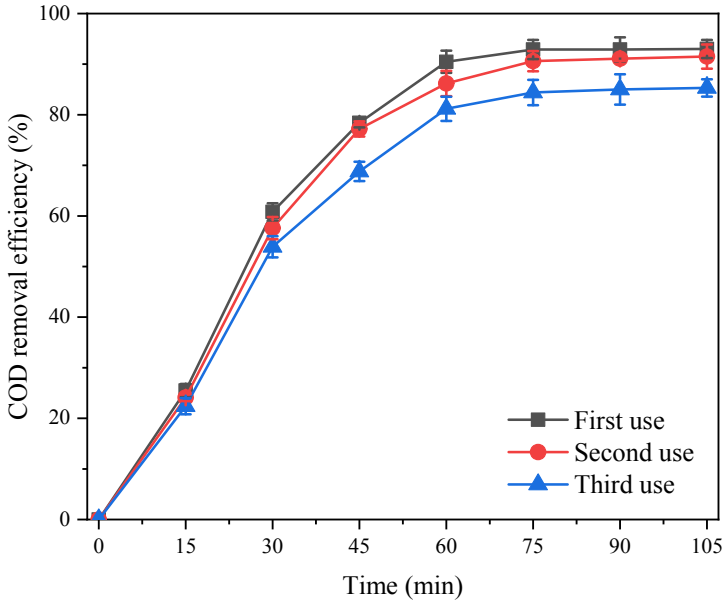


Figure S7. Removal efficiency of COD at different recycling numbers

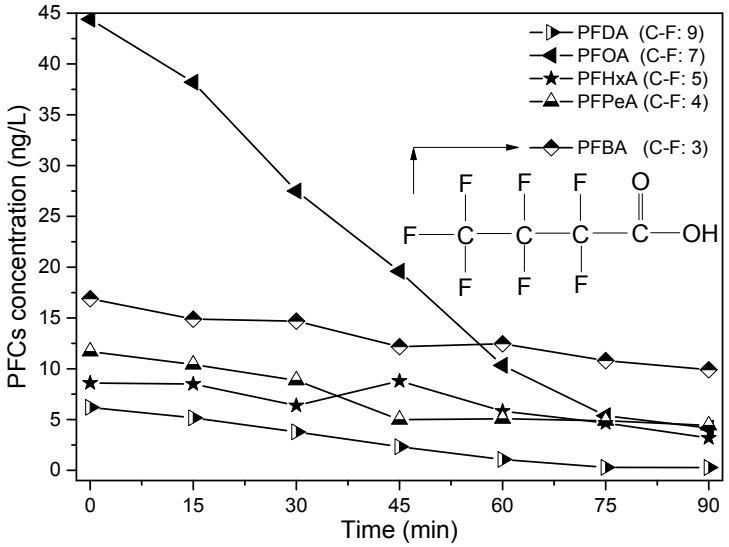
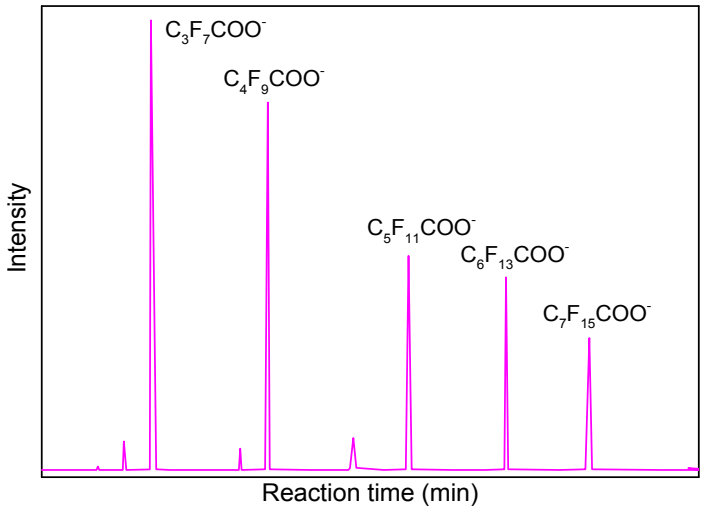


Figure S8. Effect of electrolysis time on PFCAs concentration change



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75 **Figure S9.** HPLC-MS/MS spectra for PFASs electrocatalyzed on the Ti/Ag anode after
76 electrolysis of 90 min.