

Electronic Supplementary Information

Water oxidation by a soluble iron(III)- cyclen complex: New findings

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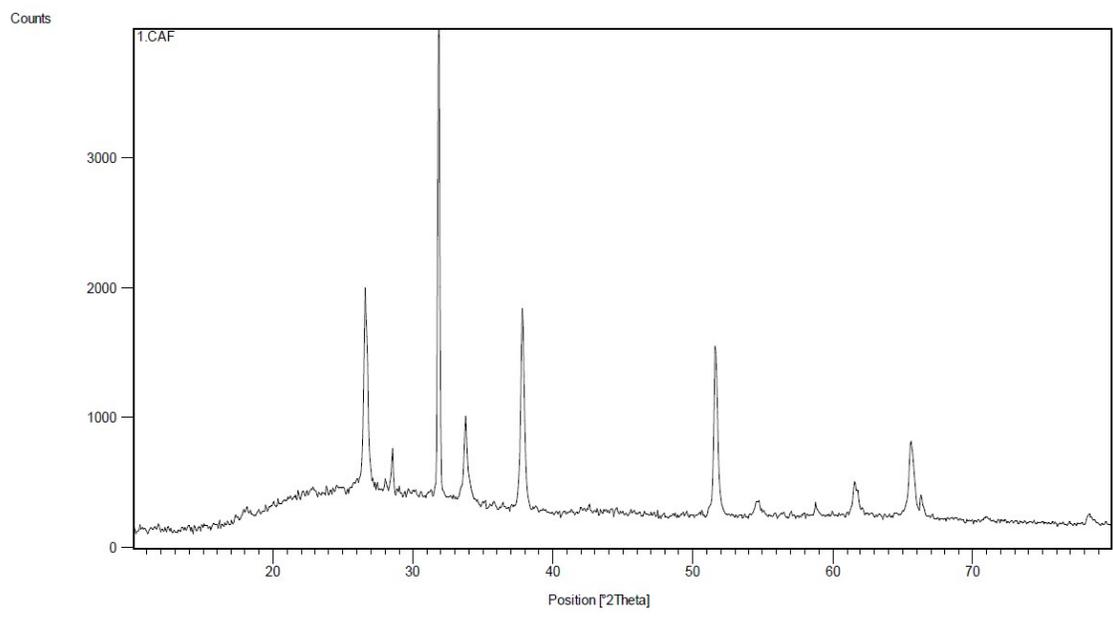
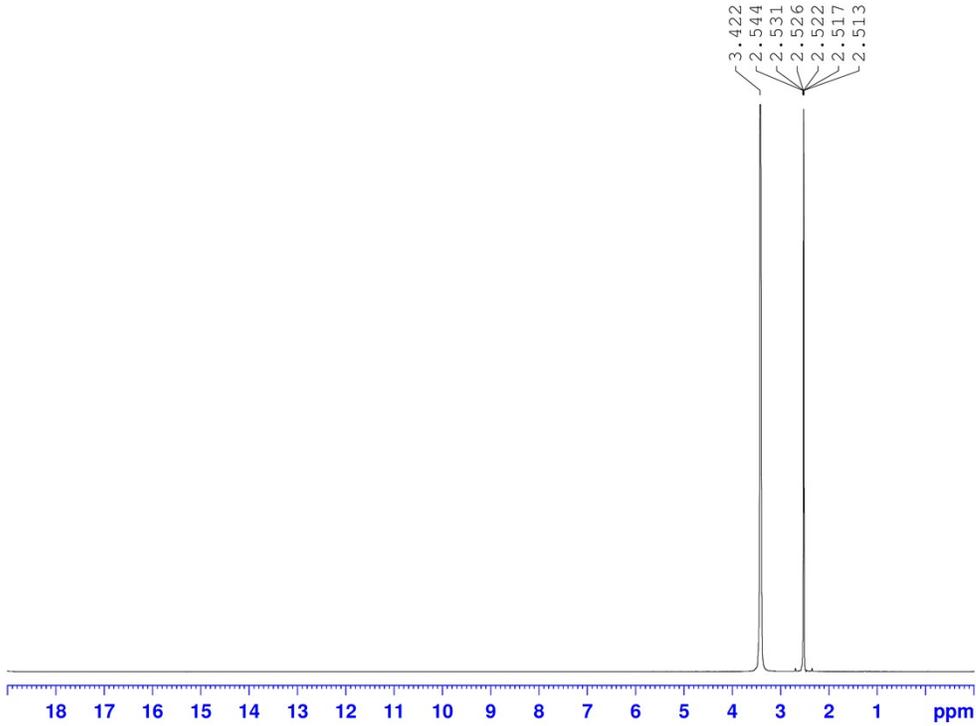


Fig. S1 XRD patterns for appeared film (**FTQ-1**) electrode during 10 hours under water oxidation in 0.25 M phosphate buffer solution (pH = 11.0) in the bulk electrolysis of **1** at 1.5 V.

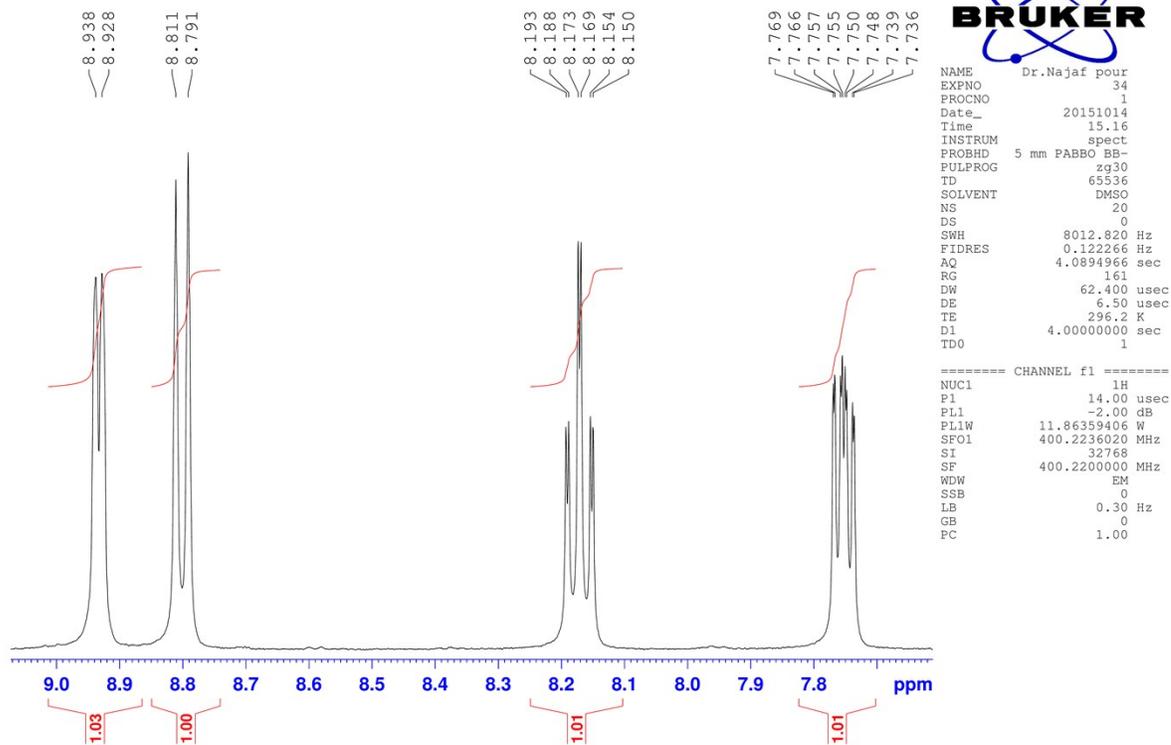


```
NAME      Dr.Najaf pour
EXPNO     36
PROCNO    1
Date_     20151025
Time      16.42
INSTRUM   spect
PROBHD    5 mm PABBO BB-
PULPROG   zg30
TD         65536
SOLVENT   DMSO
NS         20
DS         0
SWH       8012.820 Hz
FIDRES    0.122266 Hz
AQ        4.0894966 sec
RG         161
DW        62.400 usec
DE         6.50 usec
TE        297.0 K
D1        4.00000000 sec
TD0       1

===== CHANNEL f1 =====
NUC1      1H
P1        14.00 usec
PL1       -2.00 dB
PL1W      11.86359406 W
SFO1      400.2236020 MHz
SI         32768
SF        400.2200000 MHz
WDW        EM
SSB        0
LB         0.30 Hz
GB         0
PC         1.00
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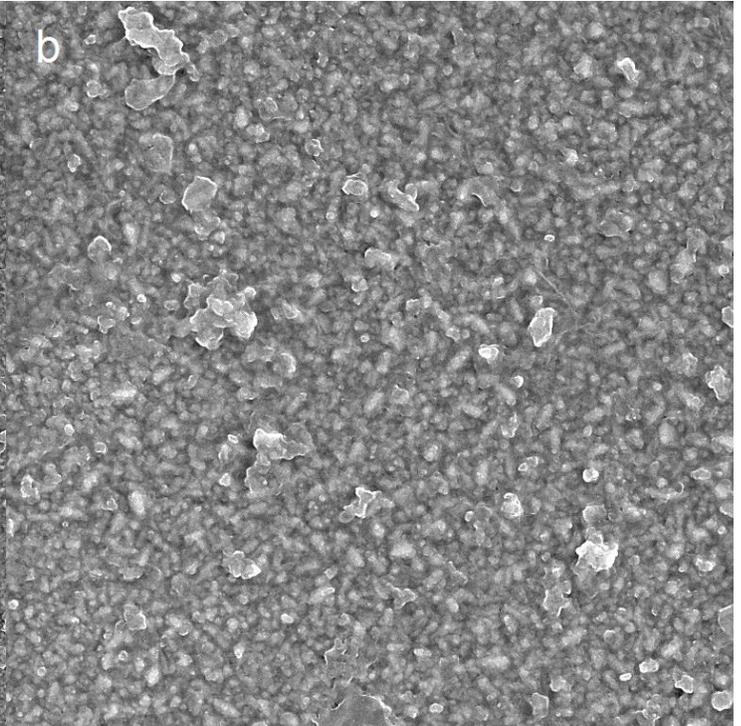
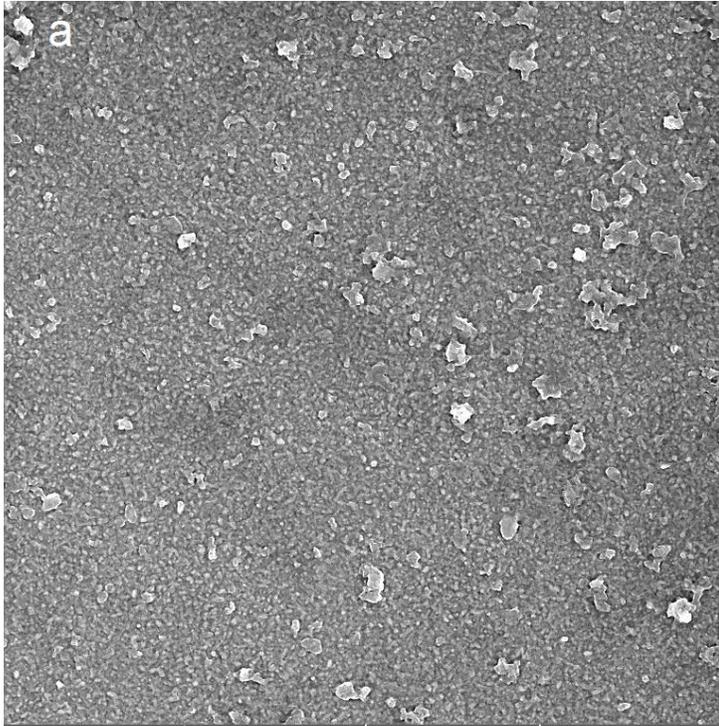
a

sample code: 1 in DMSO (safdari)



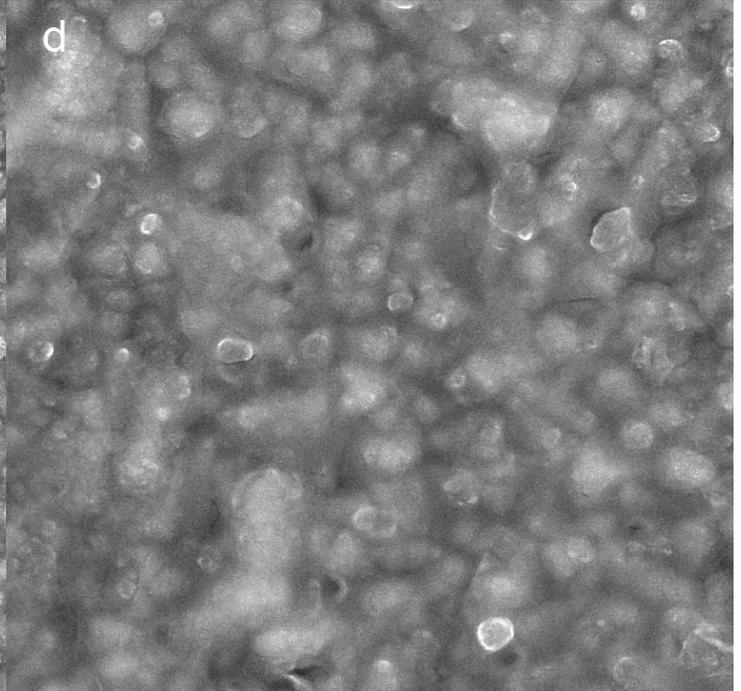
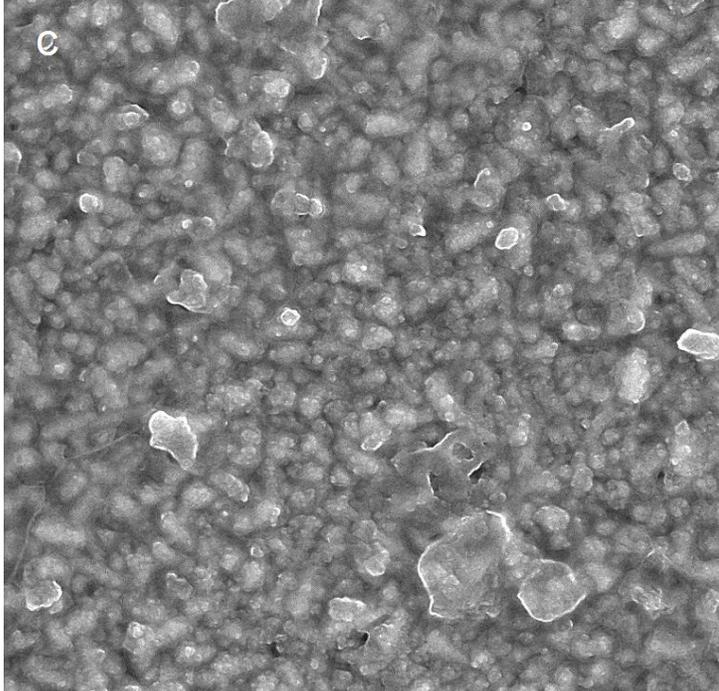
c

Fig. S2 ¹HNMR for cyclen (a) and the precipitated solid (b,c) after electrochemical reaction in DMSO.



SEM HV: 15.0 kV	WD: 4.97 mm	MIRA3 TESCAN
View field: 41.5 μm	Det: InBeam SE	10 μm
SEM MAG: 5.00 kx	Date(m/d/y): 09/02/15	RMRC

SEM HV: 15.0 kV	WD: 4.97 mm	MIRA3 TESCAN
View field: 13.8 μm	Det: InBeam SE	2 μm
SEM MAG: 15.0 kx	Date(m/d/y): 09/02/15	RMRC



SEM HV: 15.0 kV	WD: 4.97 mm	MIRA3 TESCAN
View field: 5.93 μm	Det: InBeam SE	1 μm
SEM MAG: 35.0 kx	Date(m/d/y): 09/02/15	RMRC

SEM HV: 15.0 kV	WD: 4.97 mm	MIRA3 TESCAN
View field: 2.77 μm	Det: InBeam SE	500 nm
SEM MAG: 75.0 kx	Date(m/d/y): 09/02/15	RMRC

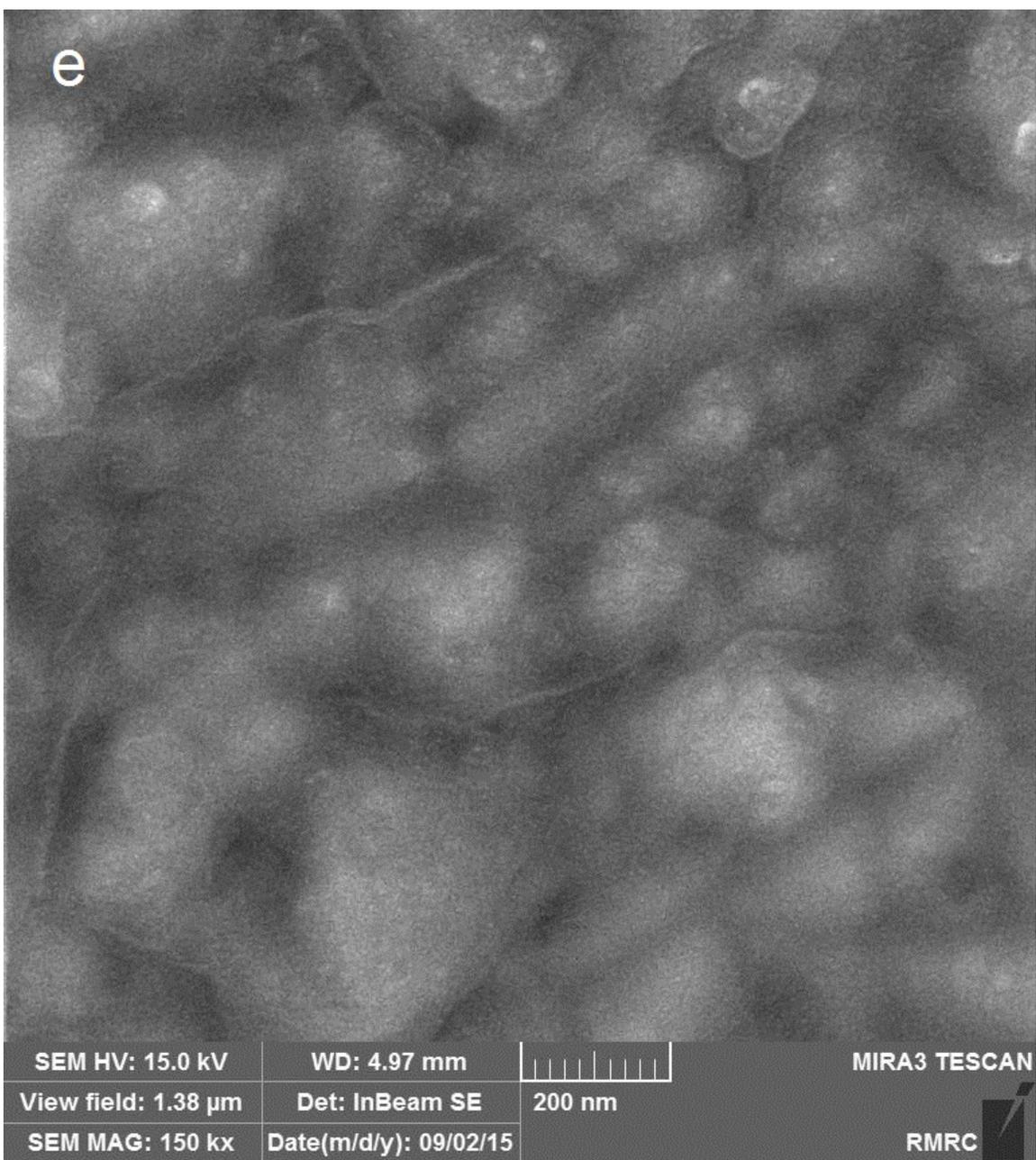


Fig. S3 SEM images for appeared film (**FTO-1**) electrode during 10 hours under water oxidation in 0.25 M phosphate buffer solution (pH = 11.0) in the bulk electrolysis of **1** at 1.5 V (a-e).

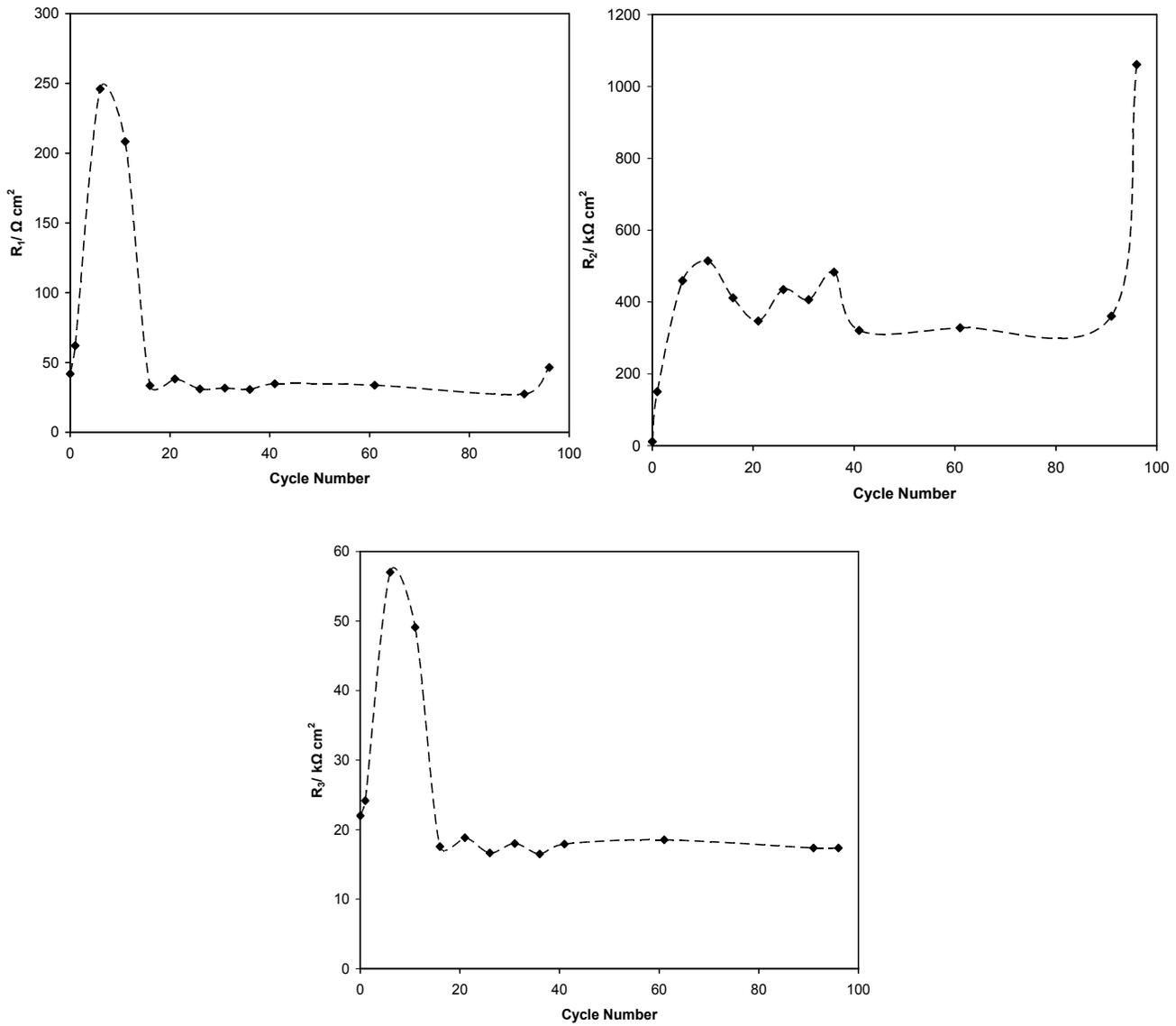


Fig. S4 Variation of R_1 , R_2 , and R_3 values with cycle number

Table S1: Equivalent circuit parameters obtained by fitting EIS experimental spectra recorded at various cycle number in LiClO₄ containing **1** solution on FTO electrode.

<i>Cycle Number</i>	$Y_0 \times 10^{-5}$ ($\Omega^{-1} s^n cm^{-2}$)	<i>n</i>	R_1 (Ωcm^2)	$C_1 \times 10^{-5}$ ($F.cm^{-2}$)	$Y_0 \times 10^{-5}$ ($\Omega^{-1} s^n cm^{-2}$)	<i>n</i>	R_2 (Ωcm^2)	$C_2 \times 10^{-5}$ ($F.cm^{-2}$)	$Y_0 \times 10^{-6}$ ($\Omega^{-1} s^n cm^{-2}$)	<i>n</i>	R_3 (Ωcm^2)
0	0.379	0.99	41.89	0.347	0.841	0.94	109930	0.834	2.87	0.74	22.00
1	0.952	0.99	62.12	0.883	0.677	0.96	149199	0.677	3.91	0.72	24.18
6	1.14	0.99	246	1.07	0.415	0.95	431580	0.426	0.827	0.37	57.02
11	1.11	0.98	208	9.79	0.464	0.95	483430	0.485	0.601	0.41	49.10
16	1.94	0.99	33.43	1.80	1.59	0.95	406310	1.75	1.20	0.80	17.57
21	2.22	0.99	38.28	2.07	1.52	0.95	341060	1.65	1.35	0.77	18.85
26	2.07	0.99	30.98	1.92	1.64	0.95	414940	1.82	0.777	0.83	16.66
31	2.00	0.99	31.61	1.86	1.64	0.94	385290	1.85	1.06	0.78	18.00
36	1.95	0.99	30.67	1.81	1.70	0.94	433350	1.94	0.830	0.83	16.51
41	2.05	0.99	34.7	1.90	1.75	0.93	318490	1.98	0.960	0.8	17.94
61	1.96	0.99	33.76	1.82	1.88	0.92	324370	2.19	1.05	0.79	18.53
91	1.69	0.99	27.47	1.56	2.20	0.90	376610	2.77	0.740	0.83	17.38
96	2.27	0.95	46.46	1.58	1.28	0.93	1022000	1.56	0.831	0.82	17.36