Electronic Supplementary Material (ESI) for Nanoscale Advances.

Supplementary materials

MXene boosted MOF-derived cobalt sulfide/carbon nanocomposites as efficient bifunctional electrocatalysts for OER and HER

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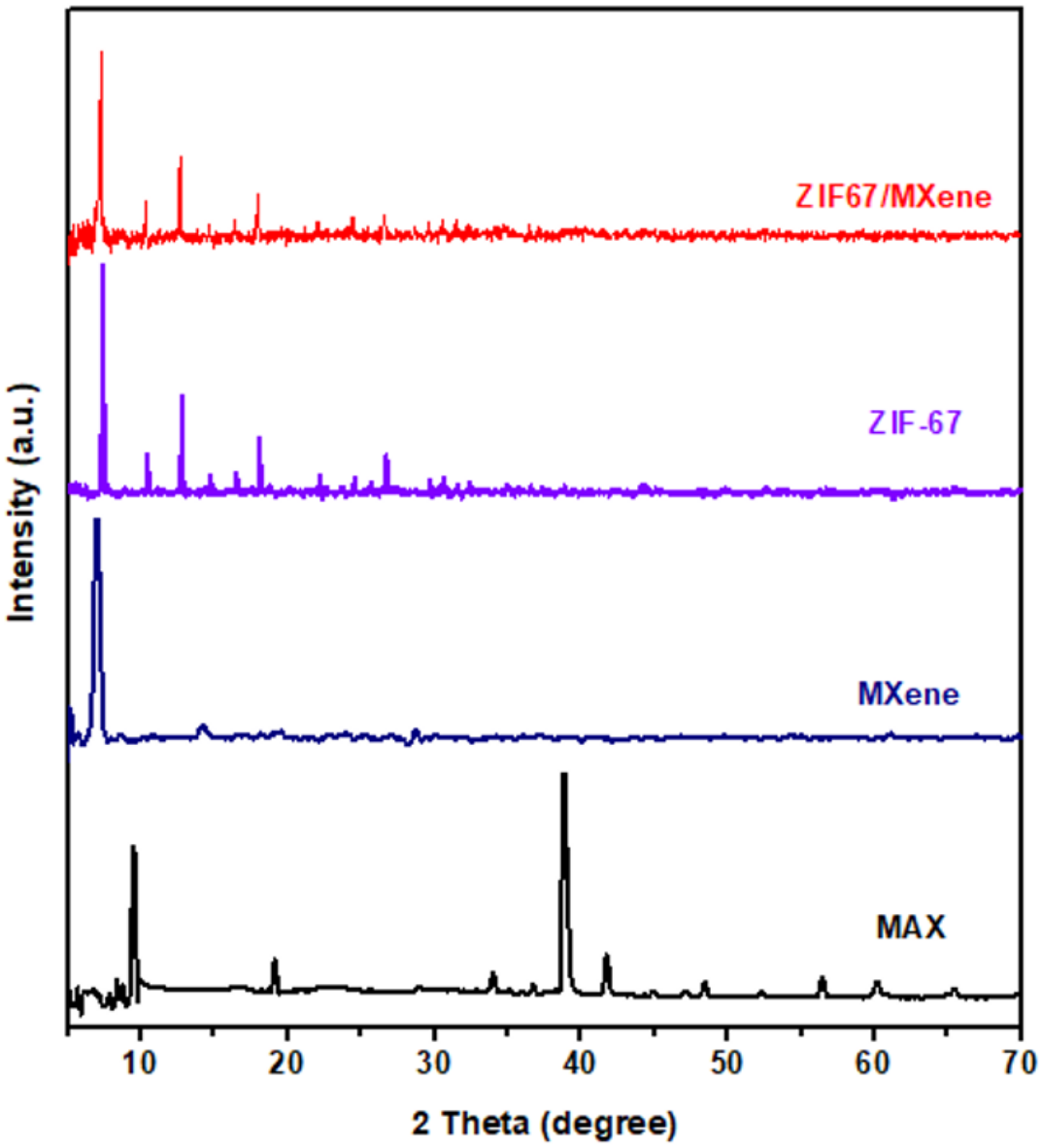

Fig. S1 Powder XRD patterns of MAX, MXene, ZIF-67 and ZIF67/MXene samples.

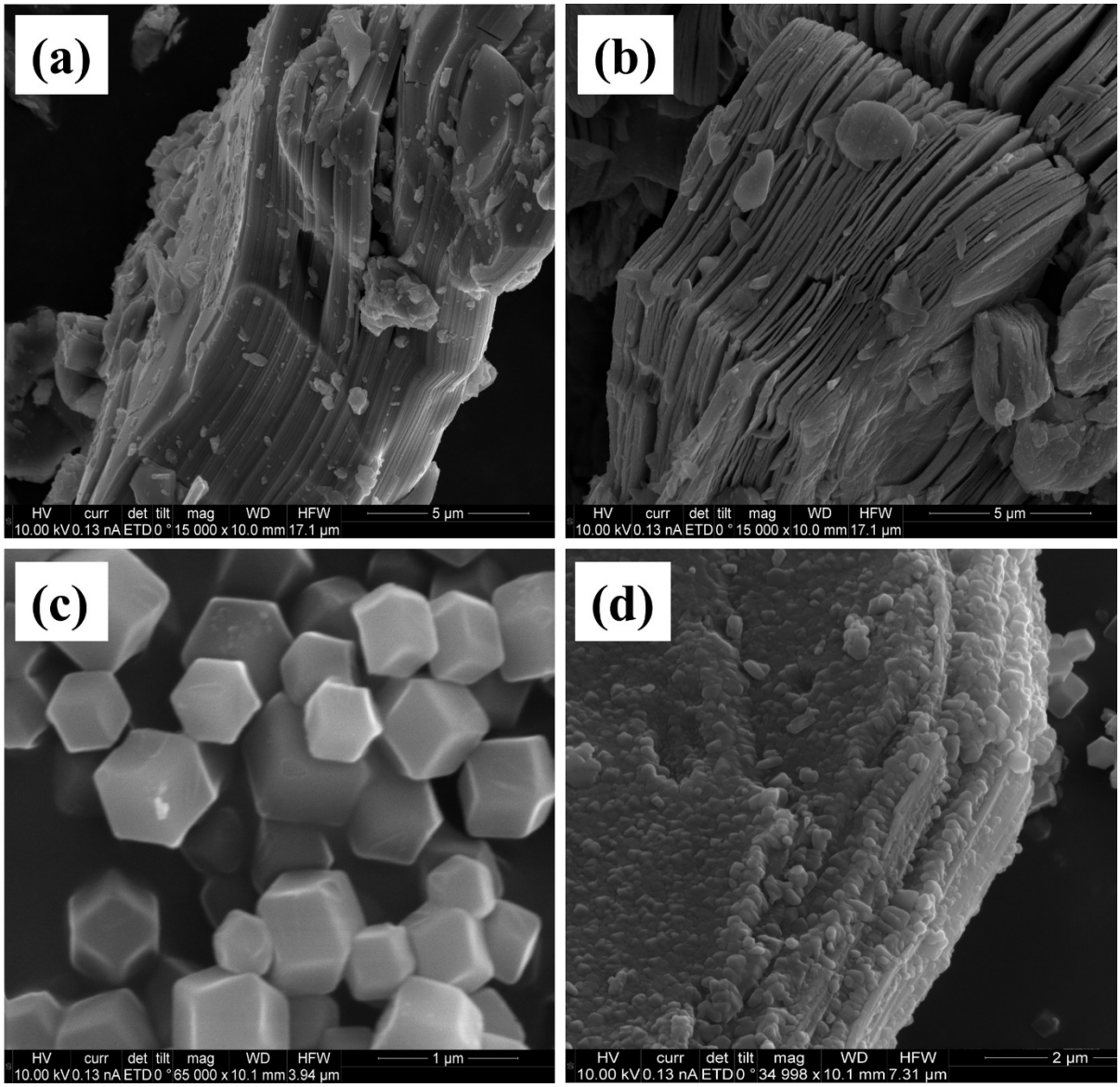

Fig. S2 FESEM images of (a) MAX; (b) MXene; (c) ZIF-67 and (d) ZIF67/MXene.

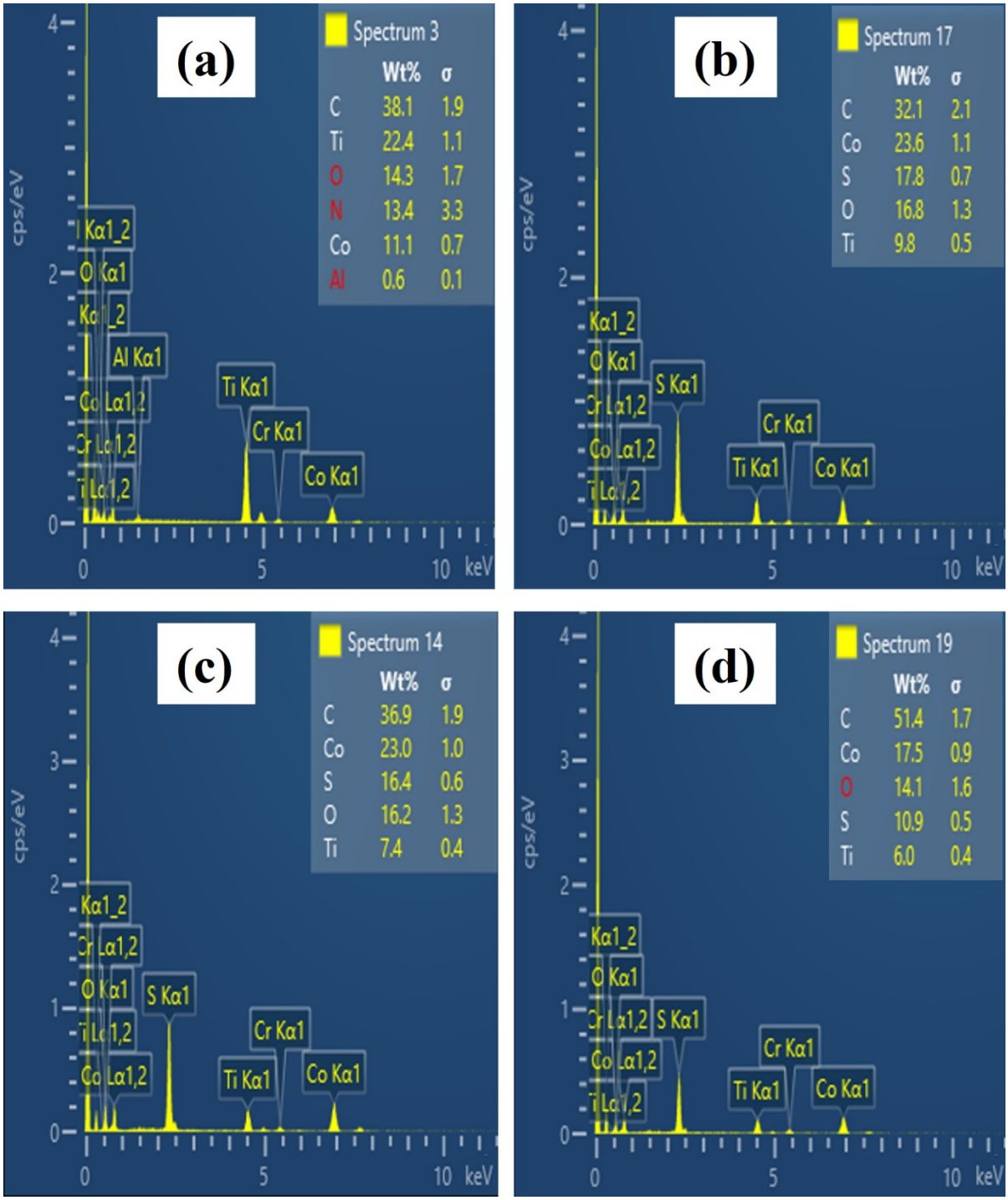

Fig. S3 EDX element analysis of (a) ZIF67/MXene; (b) CSMX-700; (c) CSMX-800 and (d) CSMX-900.

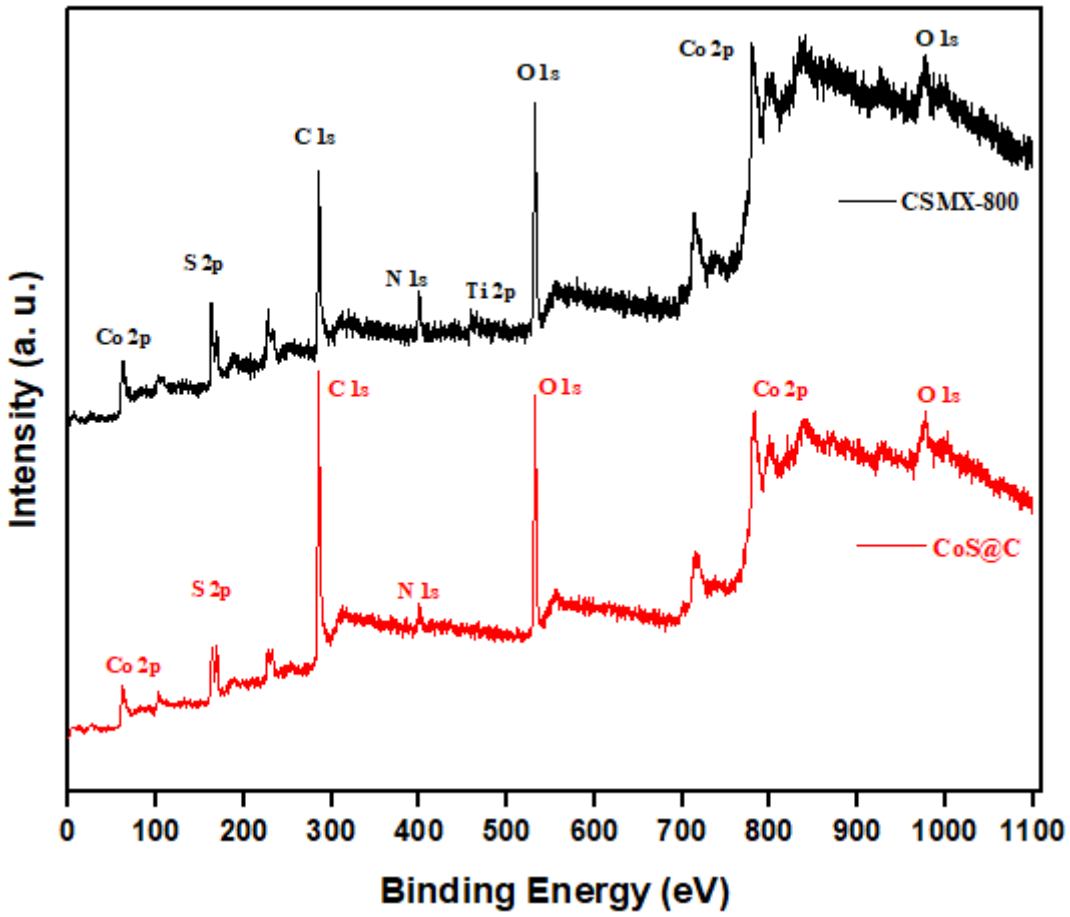

Fig. S4 XPS element survey spectrum of representative samples CSMX-800 and CoS@C.

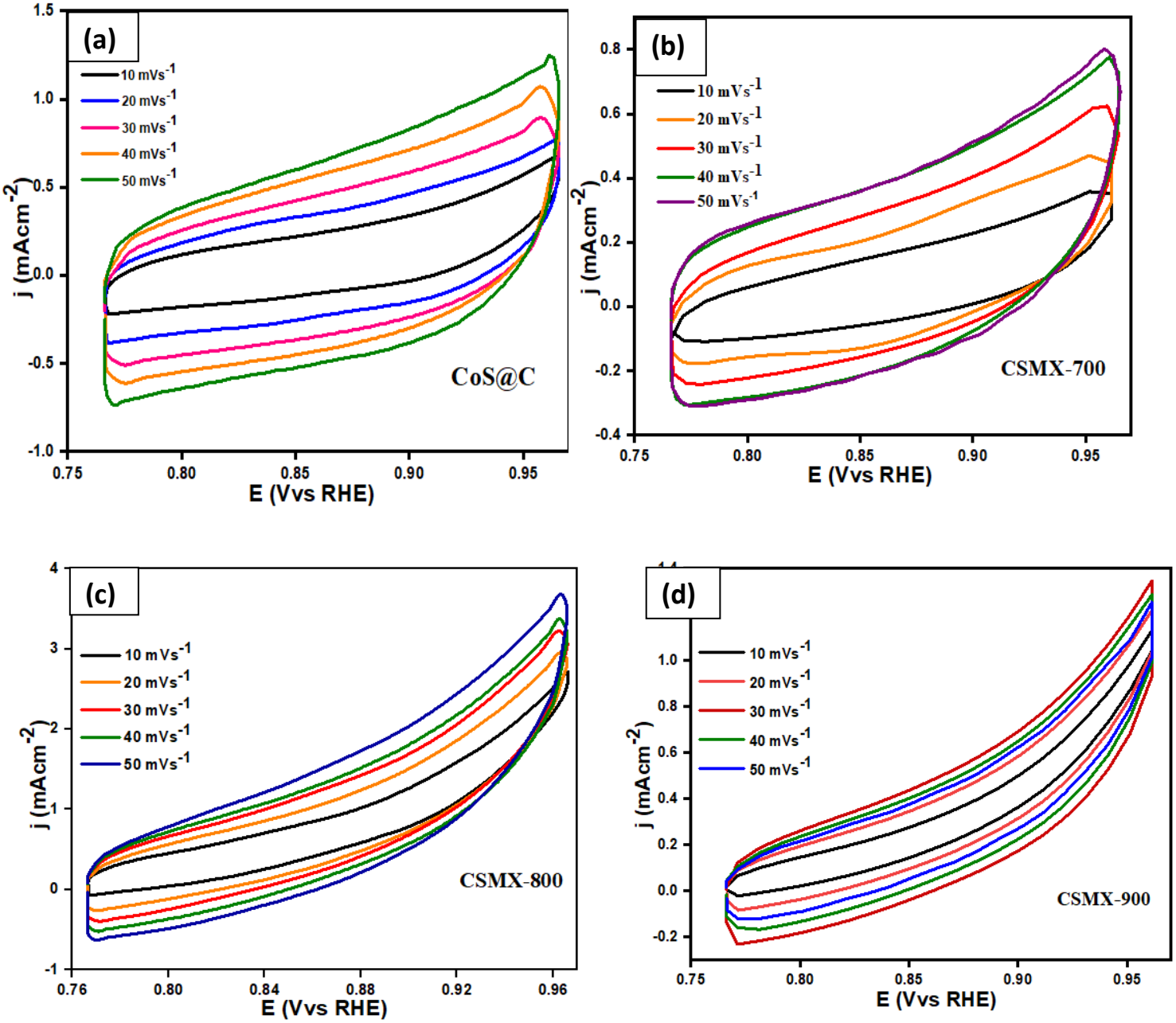

Fig. S5 Non-faradic region cyclic voltammogram at various scanning rates of (a) CoS@C, (b) CSMX-700, (c) CSMX-800 and (d) CSMX-900.

Table S1 Textural properties of studied samples

Sample	**CSMX-700**	**CSMX-800**	**CSMX-900**	**CoS@C**
Surface area ($m^2\ g^{-1}$)	160	166	172	211
Total pore volume ($cm^3\ g^{-1}$)	0.13	0.15	0.21	0.22

Table S2 Overpotential and Tafel slope values for OER and HER

Electrocatalyst	**OER overpotential value at10 mA cm^{-2} (mV vs. RHE)**	**Tafel slope (mV dec^{-1})**	**HER overpotential value at 10 mA cm^{-2} (mV vs. RHE)**	**Tafel slope (mV dec^{-1})**
CSMX-700	339	134	323	283
CSMX-800	257	95	190	103
CSMX-900	305	100	265	223
CoS@C	403	137	496	310

Table S3 C_{dl}, ECSA and R_f values of samples

Electrocatalyst	C_{dl} **(mF)**	**ECSA (cm^2)**	R_f^*
CSMX-700	0.011	0.55	7.78
CSMX-800	0.0237	1.185	16.76
CSMX-900	0.016	0.8	11.31
CoS@C	0.014	0.7	9.90

*Roughness factor R_f = ECSA/electrode's geometrical area.