

# **A Comprehensive Review on the Electrochemical Parameters and Recent Material Development of Electrochemical Water Splitting Electrocatalysts**

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**Supporting Information**

**Table S1. Comparison table of bi-functional OER and HER activities of s, p & d block metal catalyst & noble metals based on performance and lifetime**

			OER			HER		Overall water splitting	Ref
Block elements	Catalysts	Overpotential (mV) @10mA cm <sup>-2</sup>	Tafel Slope (mVdec <sup>-1</sup> )	Durability (h)	Overpotential (mV) @10mA cm <sup>-2</sup>	Tafel Slope (mVdec <sup>-1</sup> )	Durability (h)	(V) @ 10mAcm <sup>-2</sup>	
<b>s-block elements</b>	Ultrathin LiCoO <sub>2</sub>	410	88	1	-	-	-		117
	MgRuO <sub>2</sub>	228	63.3	30	-	-	-		118
	RuBe-2	-	-	-	34.8	289	50		119
	LaNiO <sub>3</sub>	1.438V	175	2	-	-	-		120
	100nmBM-SCO	500	118.2	1	-	-	-		123
	Ba <sub>0.5</sub> Sr <sub>0.5</sub> Co <sub>0.3</sub> Fe <sub>0.2</sub> O <sub>3-δ</sub> (BSCF)	350	75	-	-	-	-		124
	Sr <sub>2</sub> PdO <sub>3</sub>	500	454.1	2.8	-	-	-		125
	BaMoO <sub>3</sub>	-	-	-	380	110	-		128
	De-LiCo <sub>0.5</sub> Ni <sub>0.5</sub> O <sub>2</sub>	1.61 V	42	-	-	-	-		115
	De-LiCo <sub>0.33</sub> Ni <sub>0.33</sub> Fe <sub>0.33</sub> O <sub>2</sub>	1.525V	35	-	-	-	-		115

	De-LiCo <sub>0.33</sub> Ni <sub>0.33</sub> Mn <sub>0.33</sub> O <sub>2</sub>	1.625V	48	-	-	-	-		115
	DeLiCoO <sub>2</sub>	1.61V	50	2.5	-	-	-		115
	De-LiCo <sub>0.5</sub> Fe <sub>0.5</sub> O <sub>2</sub>	1.565V	40	-	-	-	-		115
<b>p-block elements</b>									
	Al-CoP/CC	265	67	-	53	45	40	1.56	132
	Al <sub>0.4</sub> Fe <sub>0.2</sub> Ni <sub>0.4</sub> O <sub>x</sub>	298 @ 1mAcm <sup>-2</sup>	11	24	-	-	-		133
	PA-NiO	310	36	-	138	81	-	1.56	134
	Al-NiMoO <sub>4</sub>	131	82	30	259@ 50mAcm <sup>-2</sup>	117	30		135
	Ru <sub>3</sub> Al	-	-	-	79	81	-		136
	NiFeAlO <sub>4</sub>	500	37	15	-	-	-		137
	Co <sub>1.75</sub> Al <sub>1.25</sub> O <sub>4</sub>	248	80.6	30	-	-	-		138
	GaPd <sub>2</sub> /C	-	-	-	24.3	48.3	24		141
	C-CoSe <sub>2</sub>	227	49.15	25	-	-	-		145
	CoInSe <sub>4</sub>	315	67	20	103	43	-	1.6	146
	GIZO	282	121	10	271	64	10		147

	Sn doped Ni <sub>3</sub> S <sub>2</sub>	-	-	-	137	148	10		150
	BFMO-2	266	33	24	204	165	24	1.67	161
	MoB	-	-	-	210	55	45		167
	N-BCN	158.9	65.2	-	142.7	61.3	48	1.62 1.79@ 100mAcm <sup>-2</sup>	172
	BCNONF	403	72.9	10	208	115.3	10	1.79	175
	TiSi	-	-	-	34	27.1	-		176
	MnSi	-	-	-	39	27.3	-		176
	MoAs	-	-	-	303	74	2		177
	CoTeNR/NT	350@ 100mA cm <sup>-2</sup>	75	12	202	115	-	1.64	187
	AgTe	-	-	-	27	33	6		189
<b>d-block elements</b>									
<i>Transition carbides &amp; Nitrides</i>									
	Ni-Mo <sub>2</sub> C@C	-	-	-	72	65.6	24		192

	Co <sub>2</sub> P@Co <sub>2</sub> P/Co-POM/NF	336	37	-	130	135	-	1.6	193
	CoMoS	272	45	-	97	70	-	1.6	194
	Co <sub>16</sub> -GeW <sub>9</sub> @NF	370	84	8	-	-	-	-	196
	H <sub>5</sub> l@ZIF8	375	188	3	-	-	-	-	197
	Co-NC-POM	400	94	-	133	124	-	1.6	199
	Porous Mo <sub>2</sub> C@C (1M KOH)	-	-	-	151	59	-		204
	γ-Mo <sub>2</sub> N	-	-	-	381	108	-		206
	O-MoNi-C/NF	190	65.35	100	-	-	-	1.47	210
	2D-W <sub>2</sub> N <sub>3</sub>	-	-	-	98.2	59	-		211
	CoN	290	70	-	-	-	-		212
	HFN	358	85	-	-	-	-		212
	NiMoN-NF700	290@ 50mA cm <sup>-2</sup>	46	5	40	29	5	1.498 @20mAcm- 2  1.532 @50mAcm- 2  1.559 @100mA m <sup>-2</sup>	213

	CoFe-N-CN/CNTs	285	51.09	15	-	-	-		217
	MoS <sub>2</sub> -VN(CTAB)	-	-	-	85	53.31	30		218
<b>Transition Metal Phosphides</b>									
	s-Ni <sub>5</sub> P <sub>4</sub> NPA/CP	-	-	-	56	43.6	100		219
	Zn <sub>0.075</sub> Co <sub>0.925</sub> PNRCs/CP	419	99.7	20	86	80.1	20	1.70	220
	B-CoP/CNT (0.5M H <sub>2</sub> SO <sub>4</sub> )	-	-	-	39	50	100		221
	O-NiMoP <sub>2</sub> /Ni	-	-	-	31	62.11	30		222
	NF@Fe <sub>2</sub> -Ni <sub>2</sub> P/C	205	52	-	39	30	-	1.5 1.57 @100mA 1.66 @500mA	223
	Sc-Ni <sub>2</sub> P <sup>δ-</sup> /NiHO	-	-	-	170	75	100		224
	Fe-CoP HNSs	220	65.8	20	79	60.4	20	1.55	225
	NiP/C	260	43	25	-	-	-		226
	Fe <sub>2</sub> O <sub>3</sub> @C@CoP	230	55	25	-	-	-		227
	Ni/Co doped MoP	-	-	-	102	58.1	10		228







	o-Ru-O/A@HNC-2	234	63.8	≈10	85	72.5	-		251
	NiFeIrLDH	200	-	50	34	32	-		252
	Ir-NiCoLDH	192	47	-	21	35	2		253
	NiVrIrLDH	203	55.3	-	41	35.9	-		254
	Rh- doped CoTe-ZLDH	245@ 100mA cm <sup>-2</sup>	-	-	28	42.8	10		255
	Al-Pt/Pd <sub>3</sub> Pb	-	-	-	13.8	18	25		258
	Ru nanosheet	260	54	-	20	46	-		256
	Mesoporous Ir nanosheets	240	498	-	-	-	-		260