

Table S1. Electrocatalysts composition

Electrocatalyst	Vulcan Carbon XC-72 (wt.%)	Vulcan Carbon XC-72 (mg)	Pd (wt.%)	Pd (mg)	LEEL-037 (wt.%)	LEEL-037 (mg)
Pd/C	70	7	30	3	0	0
LEEL-037(25)/Pd-C(75)	52.5	5.25	22.5	2.25	25	2.5
LEEL-037(50)/Pd-C(50)	35	3.5	15	1.5	50	5
LEEL-037(75)/Pd-C(25)	15	1.5	7.5	.75	75	7.5

Table S2. Comparison of physicochemical and electrocatalytic properties for Ru and Ir free electrocatalysts used to carry out the OER in alkaline medium.

Material	Operational overpotential at 10 mA/cm ² (mV)	Tafel slope (mV dec ⁻¹)	Crystal size (nm)	Electrolyte	Reference
LEEL-037(25)/Pd-C(75)	430	173	30.80*	KOH 0.5 M	This work
LEEL-037	480	104	35.80	KOH 0.5 M	This work
Ni-Co@carbon	243	67	---	KOH 1.0 M	[3]
Co ₃ O ₄ /NC	325	80	---	KOH 1.0 M	[4]
Ni-BDC	360	57	45.03	KOH 1.0 M	[5]
Ni _{0.75} Fe _{0.25} BDC	310	43.7	17.11	KOH 0.1 M	[6]
Fe@BIF-91	350	71	63.72	KOH 1.0 M	[7]
ZIF-67/CoNiAl-LDH/NF	303	88	46.23	KOH 1.0 M	[8]
FeNi@CNF	356	62.6	21.89	KOH 1.0 M	[9]
β-Ni(OH) ₂ /Cu ₂ S hybrid nanosheets	500	89	29.1	KOH 0.1 M	[10]
NiTe	388	117	27.98	KOH 1.0 M	[11]
Co ₃ O ₄	394	149.6	14.36	KOH 1.0 M	[12]
Fe ₂ P@NPC	510	140	----	KOH 1.0 M	[13]
NiFeP@PC	460	131	25.68		
Ni ₂ P@NPC	440	110	13		

Ni _{1.5} Fe _{0.5} P@NPC	410	87	26.9		
CoP@NG	354	63.8	17.95	KOH 1.0 M	[14]
ZnO@NMC nanocomposite	570	318	41.75	KOH 0.5 M	[15]

*Crystallite size calculated at the main diffraction peak (2θ) for Pd/C (40.3°).

Table S3. Calculated values of the equivalent circuit elements for the samples

Sample	Rs (Ω)	CPE-T	CPE-P	Rct (Ω)	χ ²
Pd/C	32.22	3.8X10 ⁻⁴	0.8176	80.13	2.5X10 ⁻³
MOF	32.85	1.8X10 ⁻⁴	0.6886	64.20	1.9X10 ⁻³
LEEL-037(25)/Pd-C(75)	33.80	9 X10 ⁻⁵	0.7558	36.42	2.6X10 ⁻³
LEEL-037(50)/Pd-C(50)	33.70	6.9 X10 ⁻⁴	0.6909	52.02	1.7X10 ⁻³
LEEL-037(75)/Pd-C(25)	33.23	2.2 X10 ⁻⁴	0.6968	64.27	2.2X10 ⁻³