

Table 1. Comparison of the activity of different platinum supported electrocatalysts for HER.

Electrode	Medium	$b/$ mV dec ⁻¹	$\eta/$ mV ($j = 10$ mA cm ⁻²)	Onset potential/ mV vs RHE	Activity	Ref
Pt/MWCNT	2.5 M H ₂ SO ₄	21.2	-84	-33	TOF= 6.3 s ⁻¹ at $\eta = -70$ mV	[72]
Pt/RGO	0.5 M H ₂ SO ₄ , 30°C	29	30	18	$j_0 = 0.18$ mA cm ⁻²	[73]
Pt/CNFs	0.5 M H ₂ SO ₄	50	175	-55	-	[74]
Pt/TiO ₂ -N-RGO	0.1 M H ₂ SO ₄	30	300		$j_0 = 19$ mA. cm ⁻² $A_{(g)} = 3116$ mA mg ⁻¹ Pt	[75]
PtNPs/S	1 M H ₂ SO ₄	-	-	15	Specific activity= 140 mA cm ⁻²	[76]
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Table.2. Summary tables of the various adopted elaboration methods and the resulting characteristic of the Pt-based catalysts.

catalysts	Elaboration methods	Reaction conditions	Morphology	Particle size (TEM)	references
RuPt/C	Dip-coating method	0.5 M H ₂ SO ₄ 2000 rpm 50 to -250 mV/RHE 20 mV s ⁻¹	Catalyst film	1.8 nm	[89]
PtNi NDs	One-pot solvothermal method	0.5 M H ₂ SO ₄ 1600 rpm 5 mV s ⁻¹	nanodentrites	26.8 nm	[90]
Pt-Cu-Ni	Chemical vapor deposition method	1 M H ₂ SO ₄ 2 mV s ⁻¹	quasi-spherical	-	[91]
Pt-Ag/SiNW	Impregnation method	0.5 M H ₂ SO ₄ 5 mV s ⁻¹	spherical	17.8 nm	[92]
PtCoFe@CN	Hydrothermal method	0.5 M H ₂ SO ₄	cubic	150 nm	[93]
PtAgNFs/rGO	One-pot aqueous fabrication	0.5 M H ₂ SO ₄ 1600 rpm 5 mV s ⁻¹	nanoflowers	66 nm	[94]