

Supplementary Information for:

Quadrafunctional electrocatalyst of nickel/nickel oxide embedded N-graphene for oxygen reduction, oxygen evolution, hydrogen evolution and hydrogen peroxide oxidation reactions

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Table of Contents

Item	Page
SEM image of Ni/Gr	1
SEM image of NGr	1
TEM-EDS Line profile.	2
TEM-EDS elemental peak profile.	2
HRTEM image of Nickel Lattice.	3
Raman of Ni/NGr, Ni/Gr and NGr	3
XRD Comparison of Ni/NGr and Ni/Gr.	4
XPS peak of Ni ₂ P _{3/2} of Ni/NGr.	4
XPS peak of Ni ₂ P _{3/2} of Ni/Gr.	5
TGA graph of Ni/Gr.	5
TGA graph of Ni/NGr.	6
Comparison table of recent Nanostructured Electrocatalysts	6

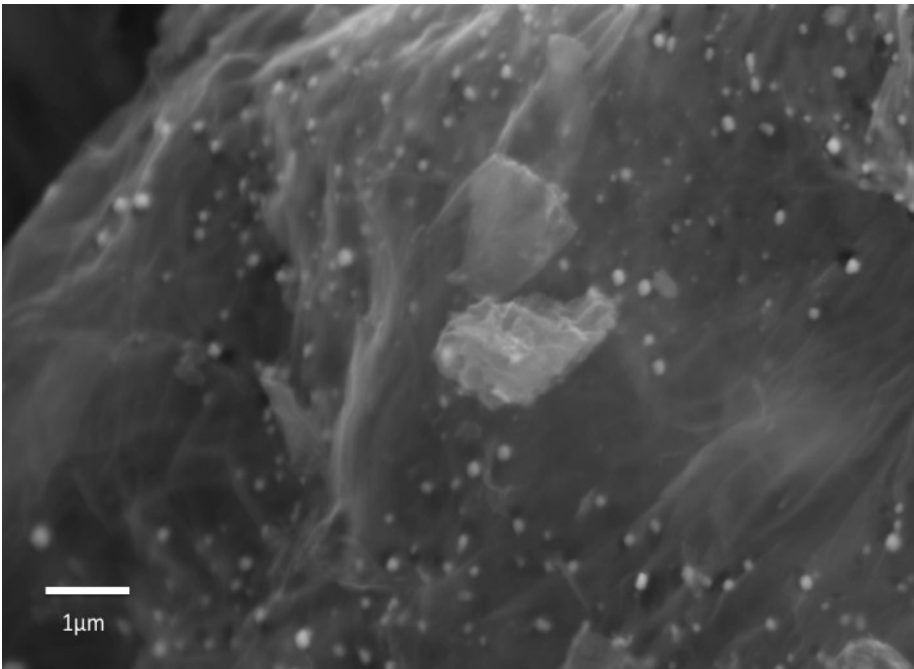


Figure S1: SEM image of Ni-Gr.

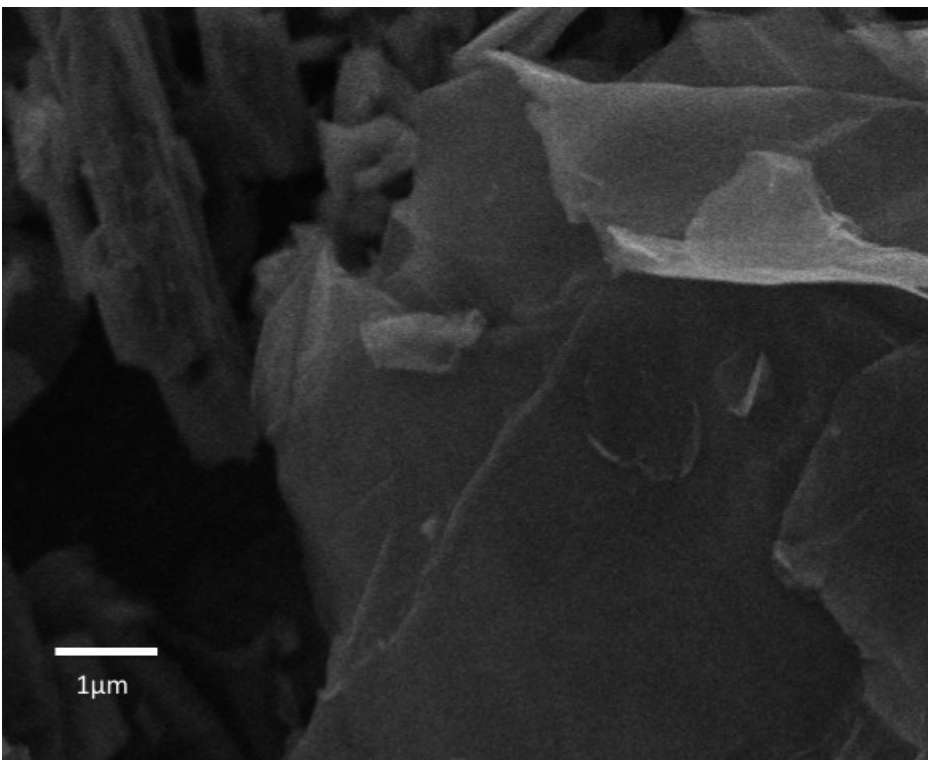


Figure S2: SEM image of NGr.

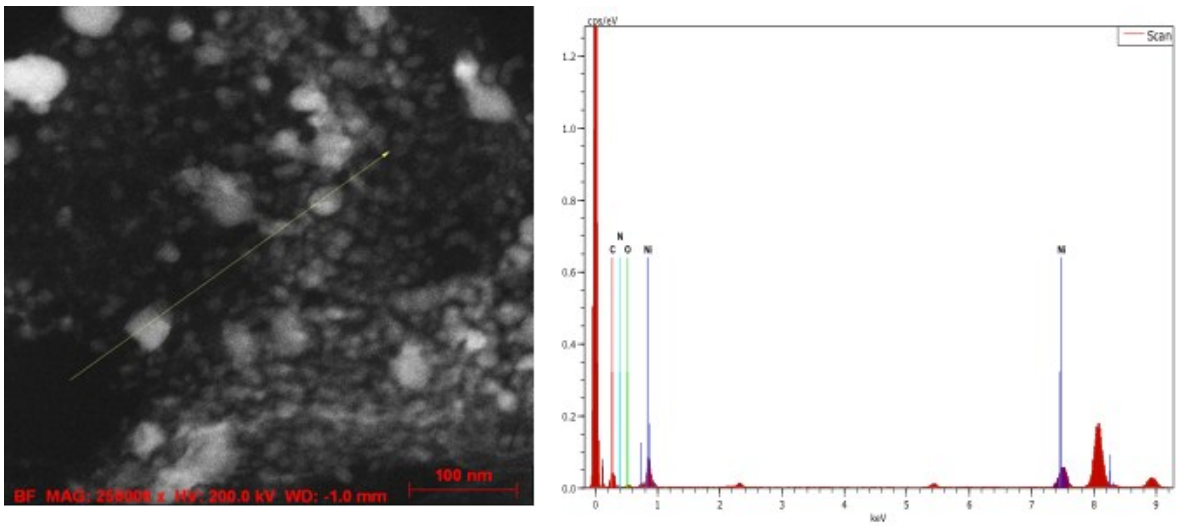


Figure S3: TEM-EDS Line profile.

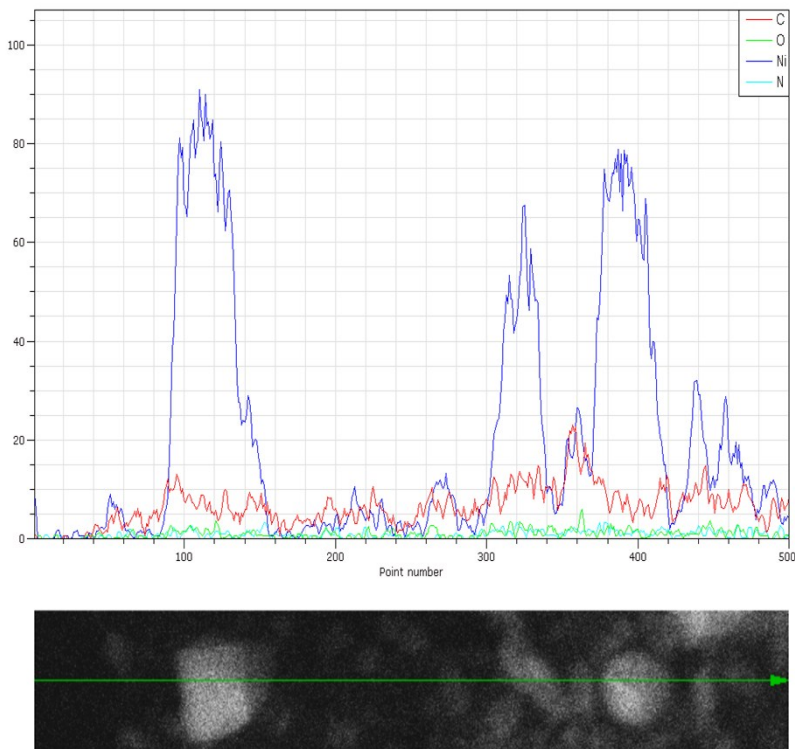


Figure S4: TEM-EDS elemental peak profile.

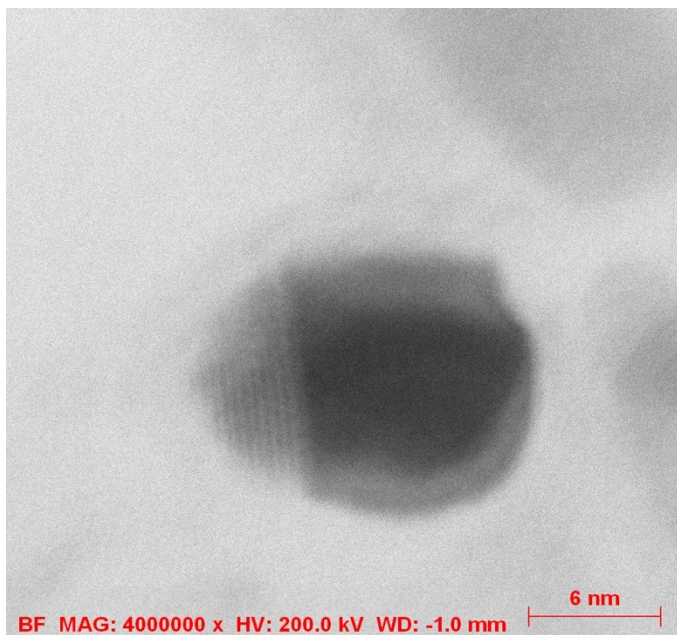


Figure S5: HRTEM image of Nickel Lattice.

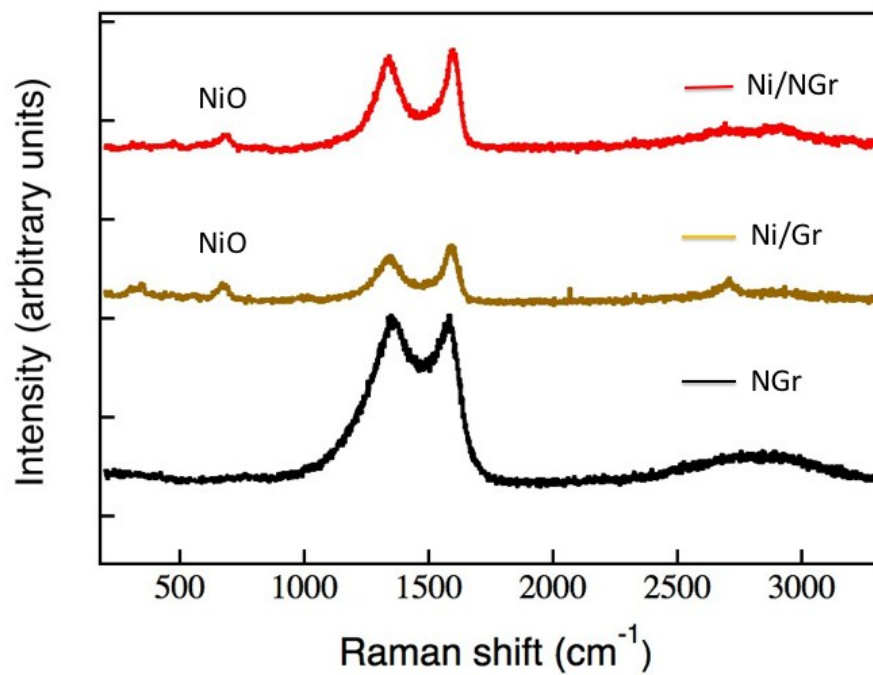


Figure S6: Raman of Ni/NGr, Ni/Gr and NGr.

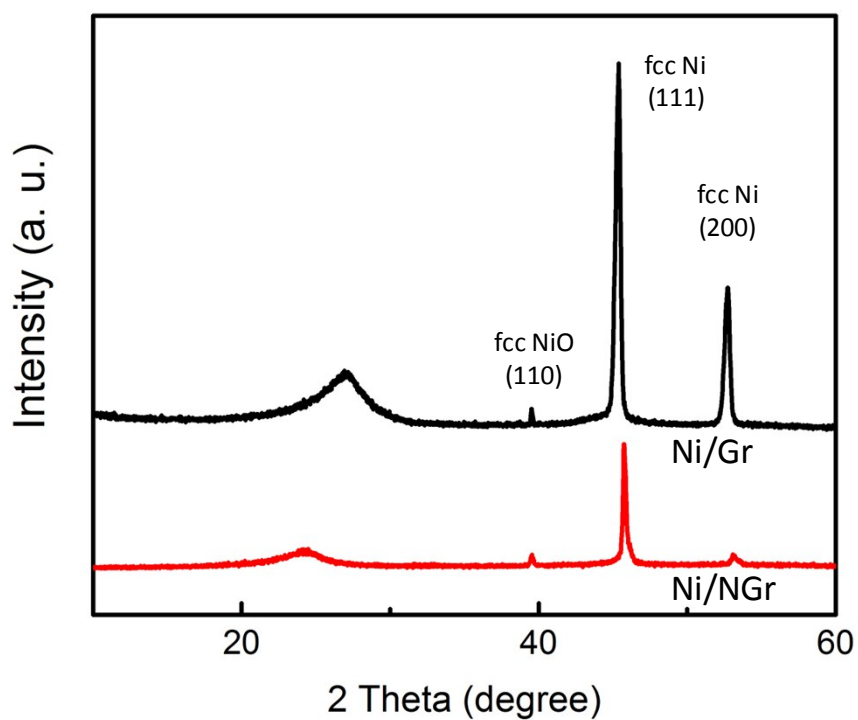


Figure S7: XRD Comparison of Ni/NGr and Ni/Gr.

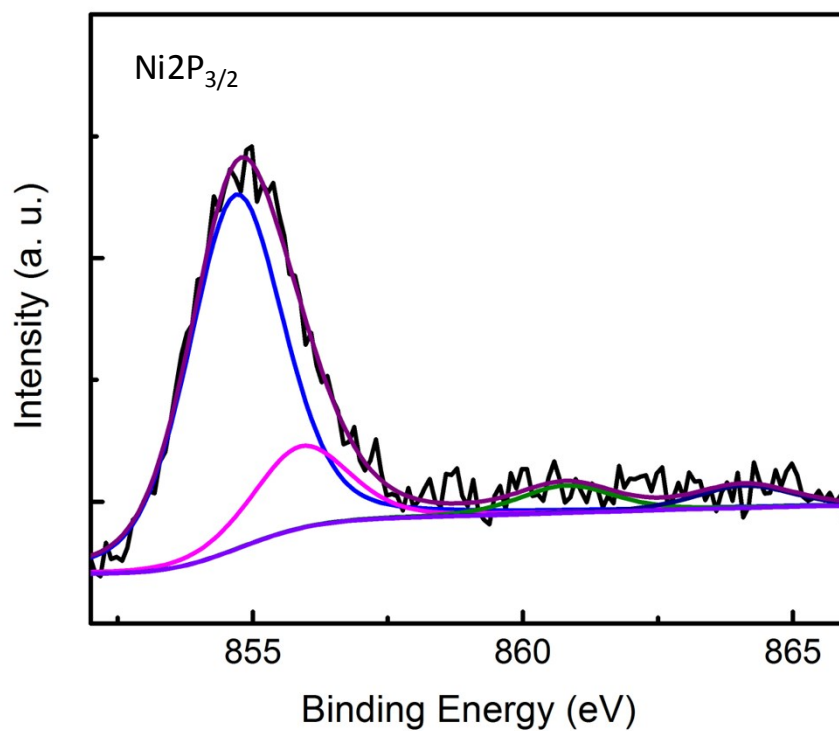


Figure S8: XPS peak of Ni₂P_{3/2} of Ni/NGr.

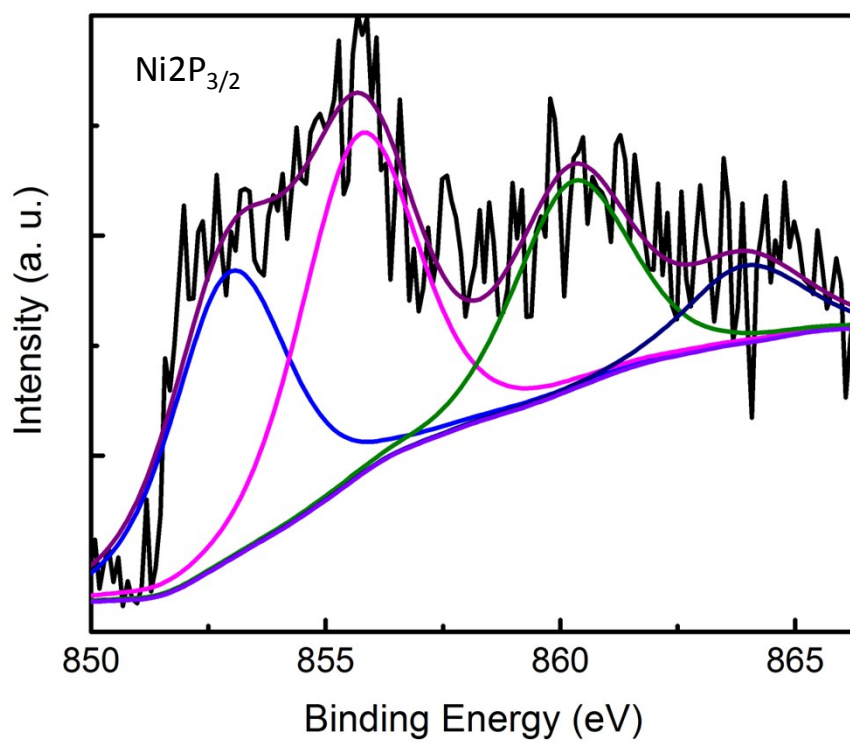


Figure S9: XPS peak of Ni₂P_{3/2} of Ni/Gr.

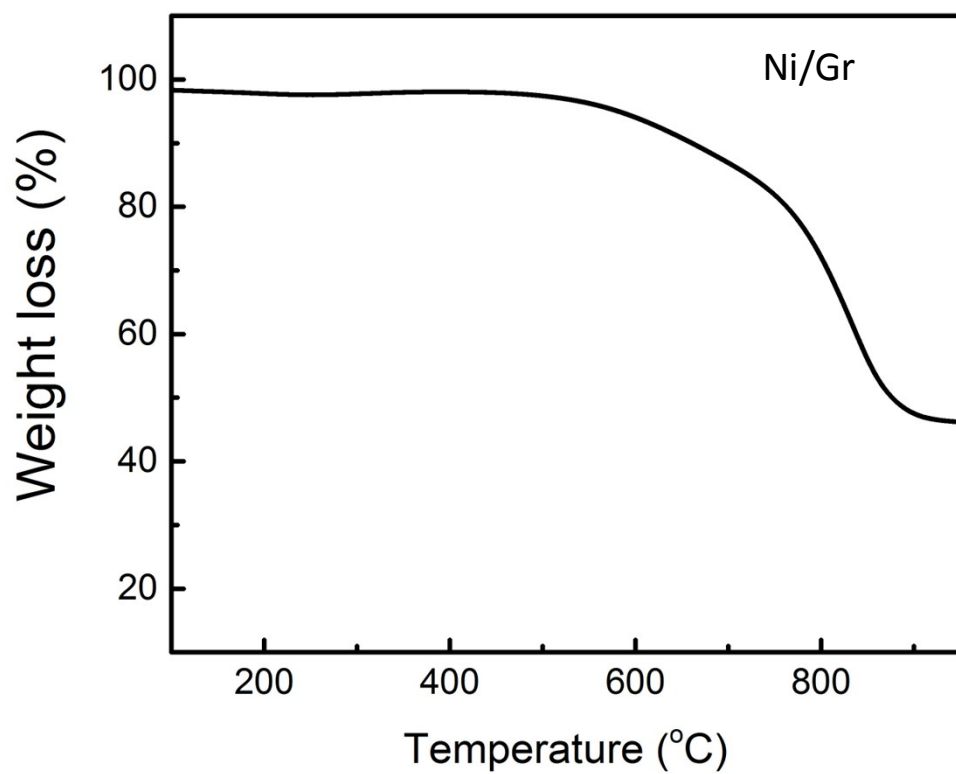


Figure S10: TGA graph of Ni/Gr.

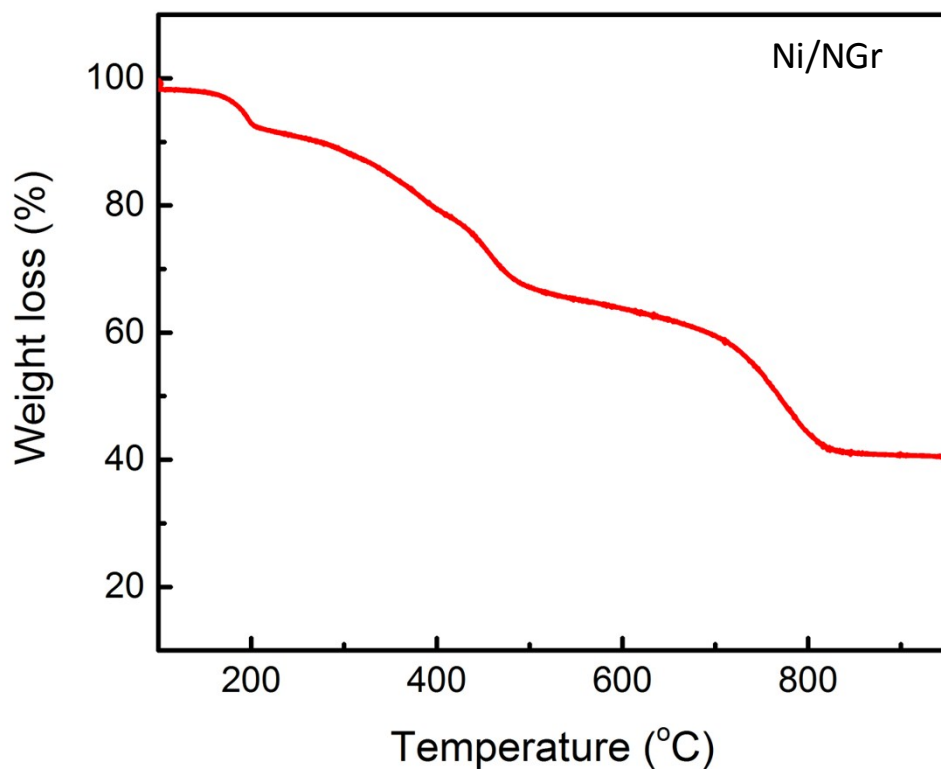


Figure S11: TGA graph of Ni/NGr.

Table T1: Comparison with Nanostructured Electrocatalysts

Catalyst	ORR & OER		HER		Ref.
	ORR potential (V vs. RHE) at 3 mA cm ⁻²	OER potential (V vs. RHE) at 10 mA cm ⁻²	Overpotential (mV vs. RHE) at 10 mA cm ⁻² in alkaline media	Overpotential (mV vs. RHE) at 10 mA cm ⁻² in acidic media	
Ir/C	0.69	1.61	--	--	1
RuO ₂ /C	0.68	1.62	--	--	2
Ni ₃ Fe/N-C Sheets	0.78	1.62	--	--	3
Fe-N-doped Carbon capsules	0.83 at <i>E</i> _{1/2}	--	--	--	4
Ni/NiO/NiCo ₂ O ₄ /N-CNT	0.74	1.60	--	--	5
NCNT/CoO-NiO-NiCo	0.83 at <i>E</i> _{1/2}	1.50	--	--	6
Ni/NiO-CNT	--	--	80	--	7
NiMoN _x	--	--	--	225	8
Co-NG	--	--	275	115	9
Mo-N/C@MoS ₂	0.8	1.39	250	--	10
N,P co-doped carbon foam	0.8	1.8	--	--	11
N,P Graphene/carbon nanosheets	0.86 at <i>E</i> _{1/2}	1.57	--	--	12
Ni/NGr	0.62	1.62	410	100	Present work

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