Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Ni_3Co/G alloy as an earth-abundant robust and stable electrocatalyst for hydrogen evolution reaction (HER)

Soumen Saha[a], Kaisnath Ojha[a], Manu Sharma[a] and Ashok K. Ganguli[a,b*]

[a] Department of Chemistry, Indian Institute of Technology, Hauz Khas, New Delhi 110016, India

[b] Institute of Nano Science and Technology, Mohali, Punjab 160062

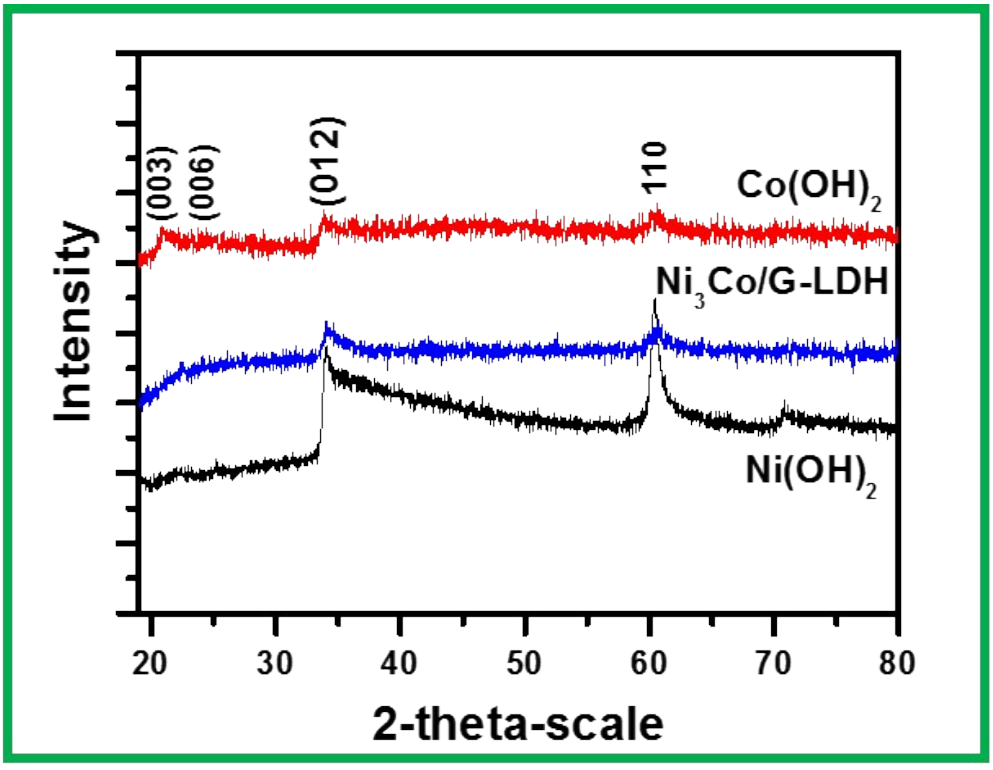


Figure S1: Powder X-ray diffraction patterns of $Ni(OH)_2$, $Co(OH)_2$ and Ni_3Co/G-LDH.

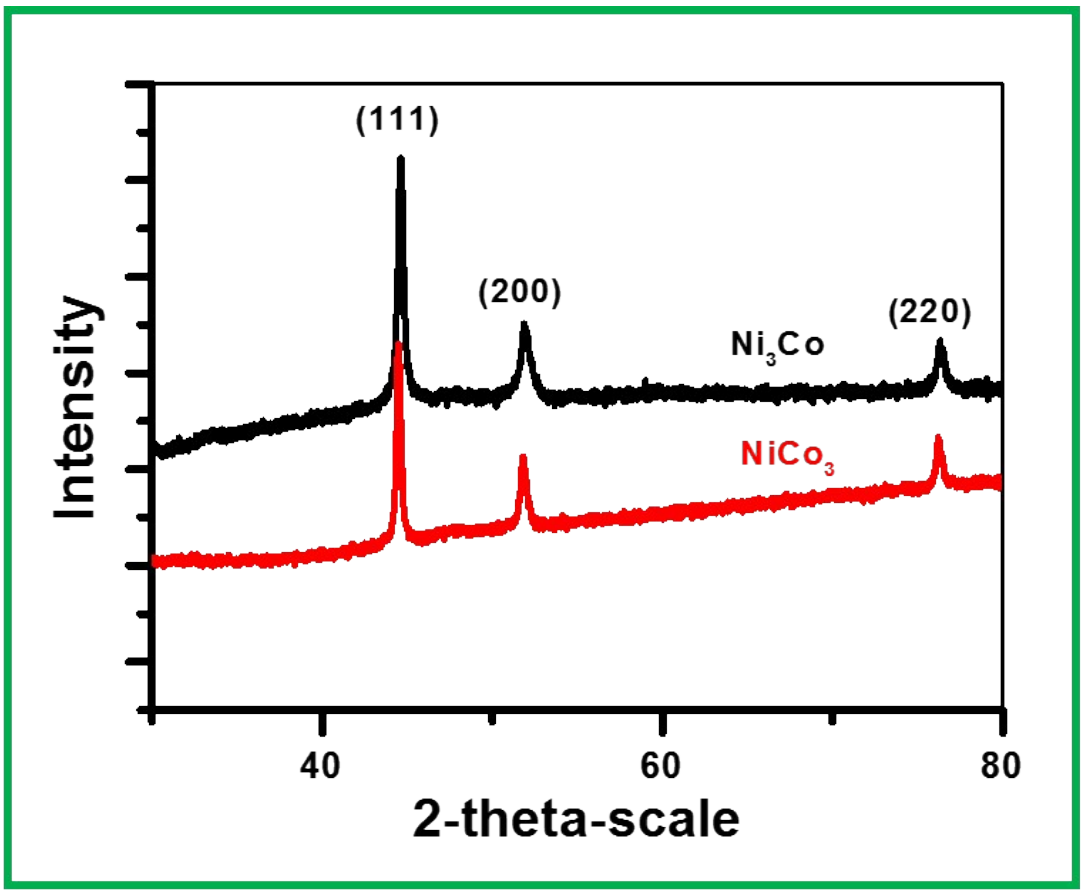


Figure S2: Powder X-ray diffraction patterns of Ni_3Co and $NiCo_3$ alloy nanoparticles.

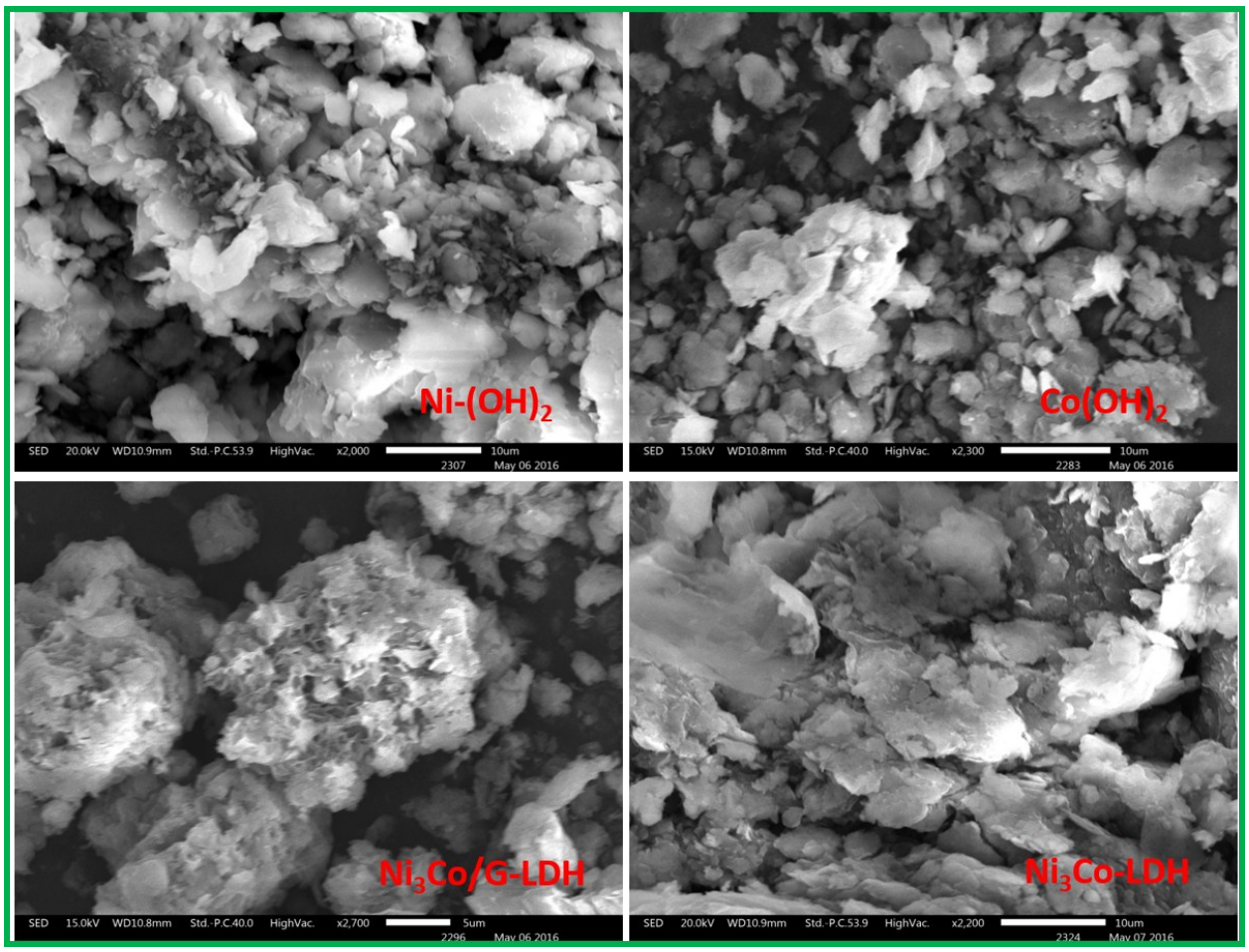


Figure S3: FESEM images of $Ni(OH)_2$, $Co(OH)_2$, Ni_3Co/G-LDH and Ni_3Co-LDH nanoparticles.

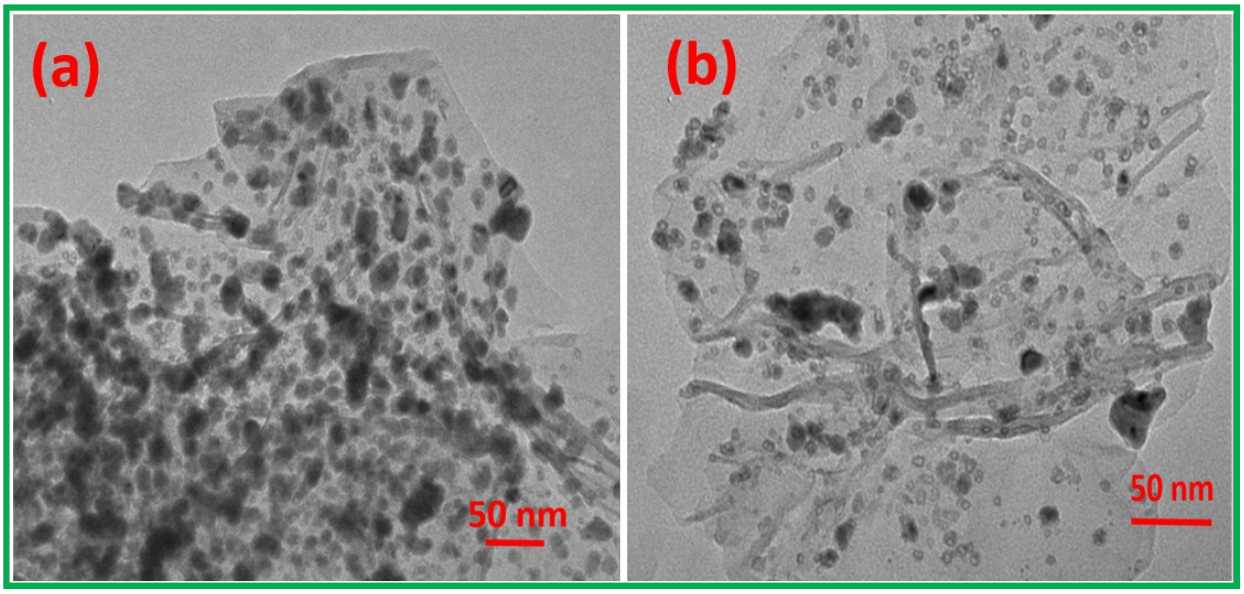
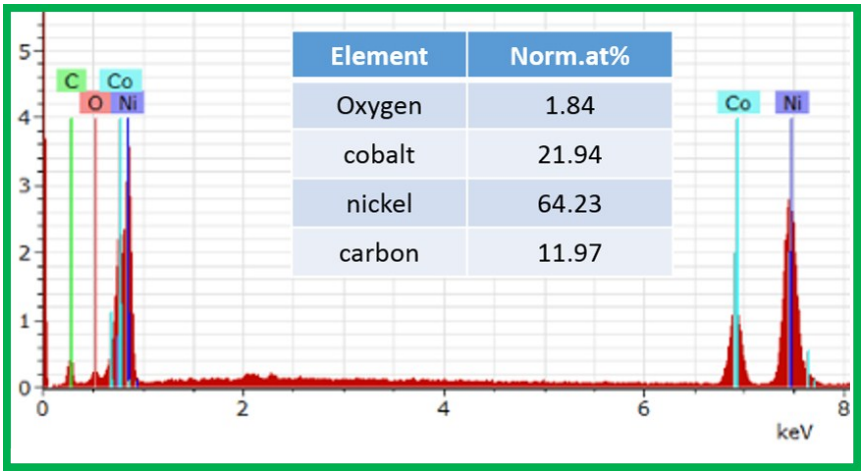


Figure S4: TEM images of Ni_3Co/G alloy nanoparticles before (a) and after (b) 16h of chronopotentiometric study.



Element	Norm.at%
Oxygen	1.84
cobalt	21.94
nickel	64.23
carbon	11.97

Figure S5: SEM-EDS composition of Ni_3Co/G alloy nanoparticles after 16h of chrono study.

Table S1. Comparison of HER performances of Ni_3Co/G alloy with other non-noble-metal electrocatalyst in alkaline media

Catalyst	Current density (j, mA cm^{-2})	Overpotential at the corresponding j(mV)	Ref
Ni_3Co/G	**10**	**95**	**This work**
MoS_2/graphene/Ni	1	170	[1]
NiMoN	10	109	[2]
CoOx/CN	10	270	[3]
porous Co phosphide/phosphate film	10	~380	[4]
FeP nanosheet[a]	10	240	[5]
cobalt-phosphorous derived film	10	94	[6]
NiO/Ni-CNT	10	<100	[7]
Co_9S_8@MoS_2/CNFs	10	190	[8]
Co/Co_3O_4 core/shell nanosheets	20	129	[9]
U-CNT-900	10	240	[10]
CuMoS4 crystal[b]	2	135	[11]
Co-NRCNT	10	370	[12]
Co-NCNT/CC	10	180	[13]
Ni-Mo alloy/Ti	10	<100	[14]
NiS_2/CC	10	149	[15]
bulk Mo_2C	10	192	[16]
$Co_{0.6}Mo_{1.4}N_2$[c]	10	200	[17]
MoC_x nano-octahedrons	10	150	[18]

Ni_2P nanoparticles	10	230	[19]
Ni_3S_2/NF	10	123	[20]
WP_2 submicroparticles	10	153	[21]
WP NA/CC	10	150	[22]
NiSe/ NF	10	96	[23]
CoP/CC	10	209	[24]

a= in H_2SO_4: b= in pH 7 phosphate buffer; c= in 0.1 M $HClO_4$

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