1 **Electronic Supporting Information (ESI)**

2 **Reline-assisted synthesis of fcc-hcp Ni/Ni(OH)$_2$ nanocatalyst for effective reductive**

3 **hydrogenation of 4-nitrophenol**

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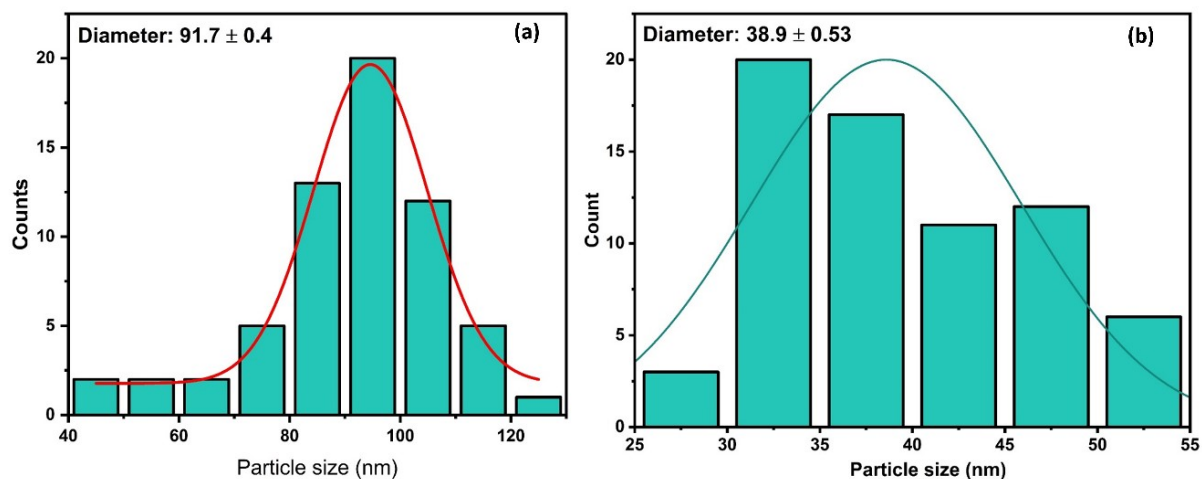16 Shakhawat H. Firoz (shfiroz@chem.buet.ac.bd)

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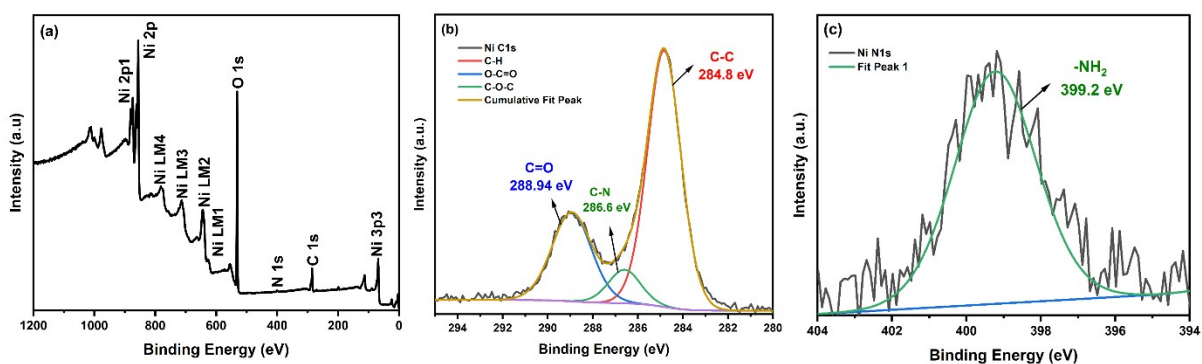Fig. S1. Average particle size histogram (a) Ni-aq. and (b) Ni-reline

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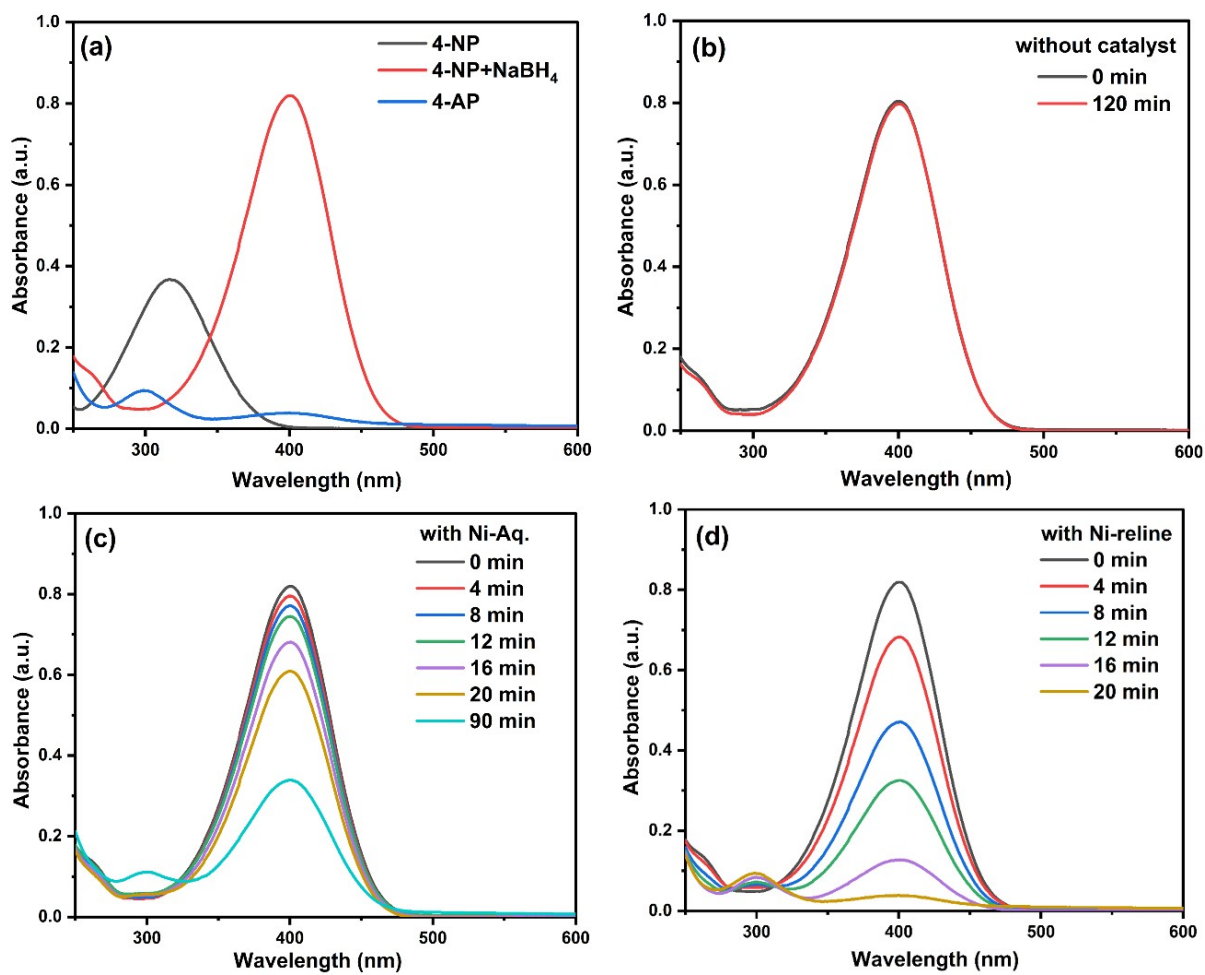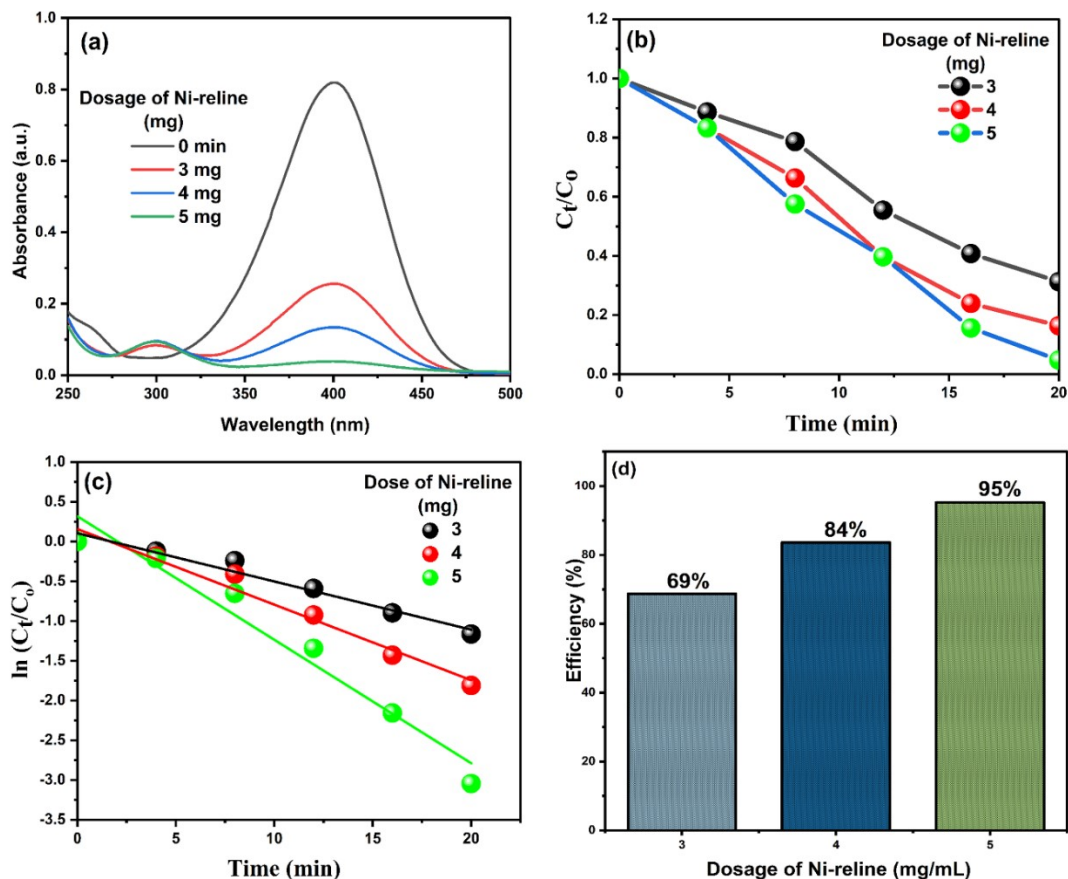
Fig. S2. Survey XPS spectrum of Ni-reline, (b) C 1s XPS spectrum and (c) N 1s XPS spectrum.

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Fig. S3. UV-Vis absorption spectra of (a) 4-NP, 4-NP+NaBH$_4$, 4-AP (b) hydrogenation of 4-NP without catalyst (c-d) catalytic hydrogenation of 4-NP with Ni-Aq. and Ni-reline.
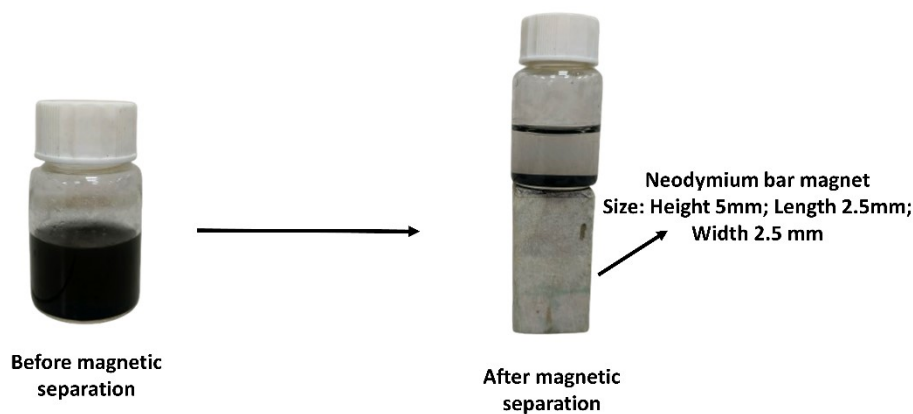
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Fig. S4. Comparative analysis of (a) Time-dependent UV-vis spectral changes of the catalytic hydrogenation of 4-NP to 4-AP using $NaBH_4$ at different amounts of Ni-reline (b) C_t/C_0 vs time (c) Efficiency after 20 minutes.

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Fig. S5. Magnetic separation of $Ni/Ni(OH)_2$ nanocomposite.

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37 Table S1. Chemical composition in Atomic % of the Ni-reline derived from XPS analysis

Sample	Atomic % of each element			
	Ni	C	O	N
Ni-reline	23.56	20.44	53.98	2.02

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39 Table S2. A summary of the correlation coefficient of ln (C_t/ C_0) vs. time plot, rate constant, and
40 activity parameter for the reduction of 4-NP of the synthesized nanocatalysts

Catalyst	k (min^{-1})	R^2	Efficiency (%)
Ni-Aq.	0.0121	0.94	26
Ni-reline	0.1336	0.97	95

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42 Table S3. Summary of the correlation coefficient of ln (C_t/ C_0) vs. time plot, rate constant, and
43 activity parameter for reducing 4-NP of different dose of Ni-reline

Dose of catalyst (mg)	k (min^{-1})	R^2	Efficiency (%)
3	0.0607	0.96	69
4	0.0901	0.97	84
5	0.1559	0.96	95

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45 Table S4. Summary of the catalytic performance of Ni-reline at various pH within fixed time
46 duration

Time	Efficiency (%)				
	pH 3	pH 5	pH 7	pH 9	pH 11
0	0	0	0	0	0
4	57.9	42.5	20.9	16.5	1.3
8	84.9	76.1	42.5	21.4	1.7

12	96.7	90	62.5	27.8	2.2
16	98	96.9	84.4	35.3	3.7
20	98.2	97.8	95.2	41.9	4.0

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