Electronic Supplementary Information

Efficient hydroxylation of benzene to phenol by H_2O_2 using Ni-doped $CuWO_4$ on carbon nitride as a catalyst under solar irradiation and its structure-activity correlation

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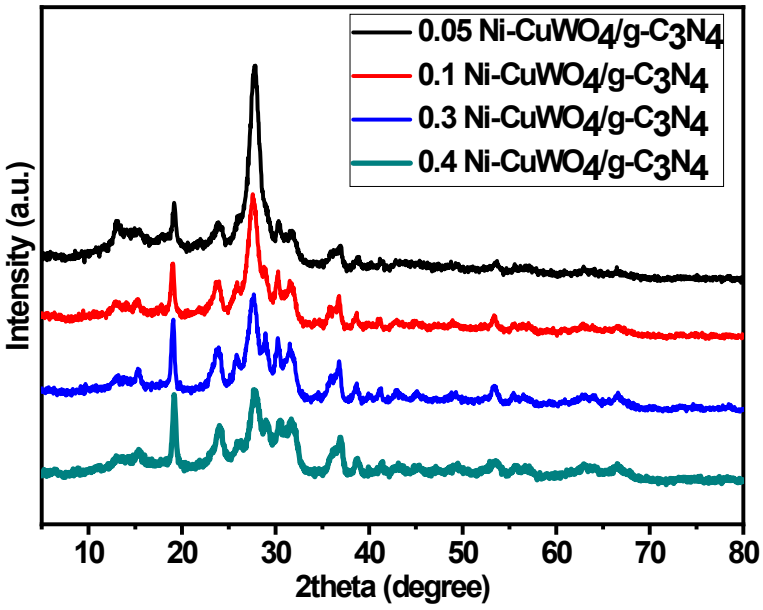

Figure S1. PXRD pattern of Ni-$CuWO_4$/g-C_3N_4 havingdifferent mass ratio

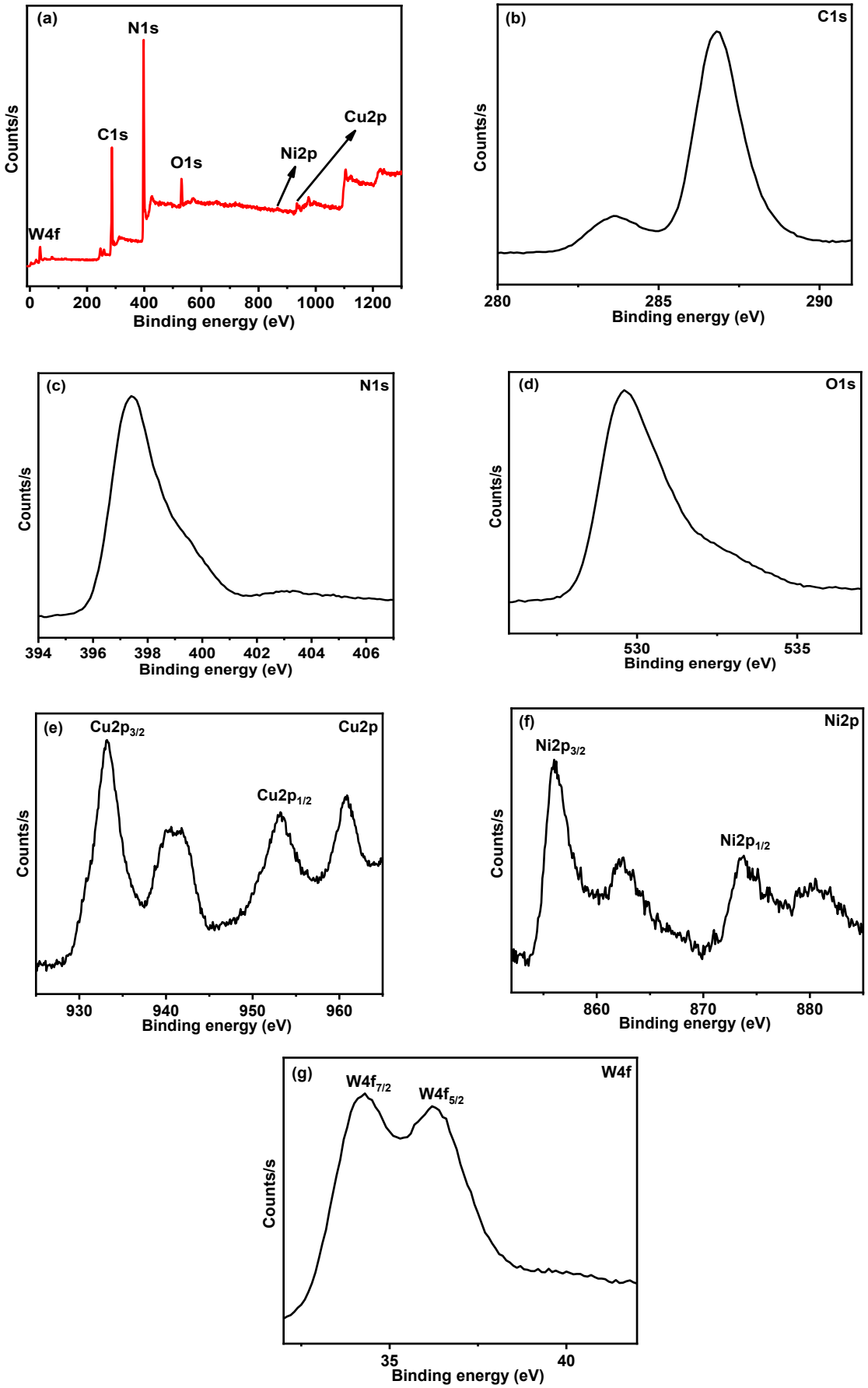

Figure S2. (a) XPS Survey, (b) C1s spectra, (c) N1s spectra, (d) O1s spectra, (e) Cu2p spectra, (f) Ni2p spectra and (g) W4f spectra of the recycled catalyst 0.2 Ni-$CuWO_4$/g-C_3N_4

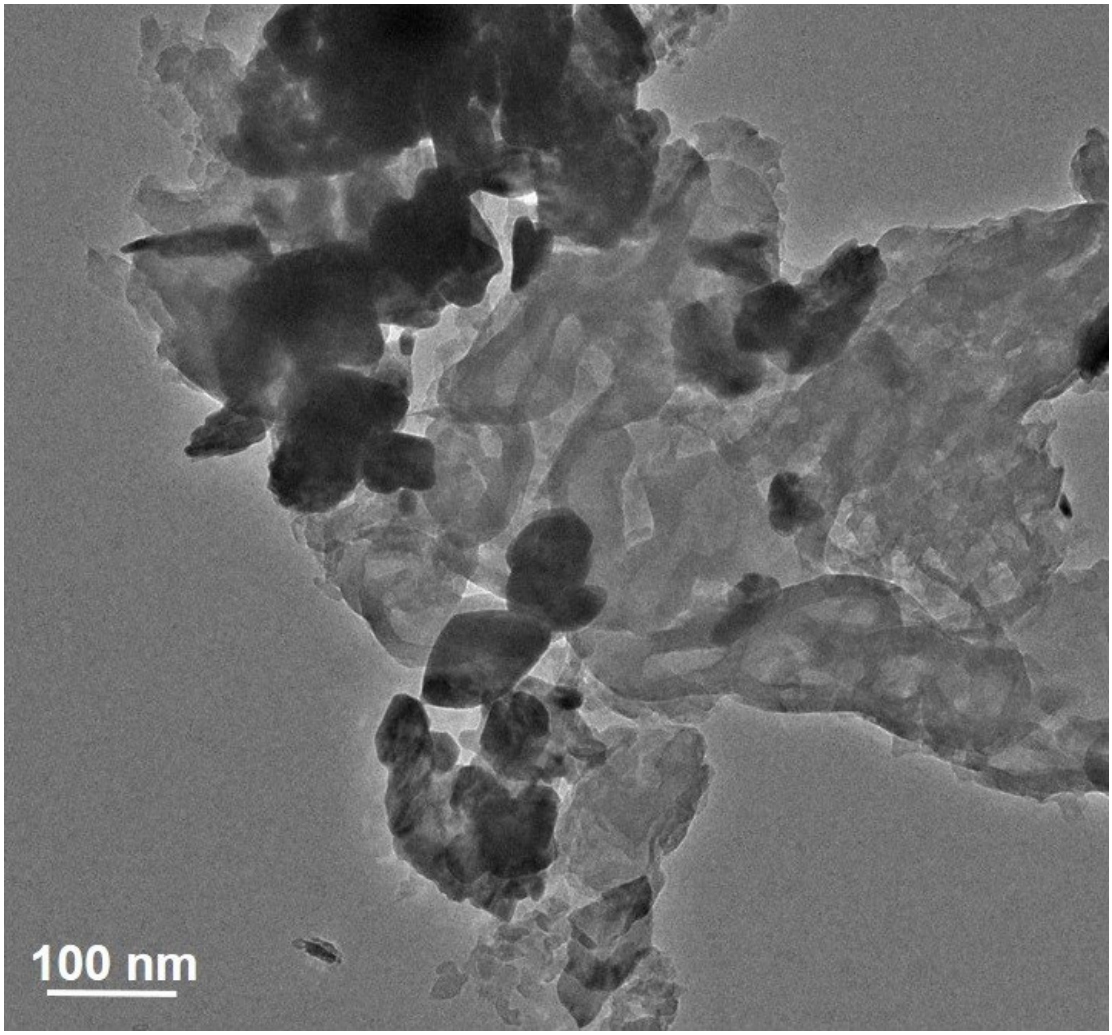

Figure S3. TEM image of recycled catalyst 0.2 Ni-$CuWO_4$/g-C_3N_4

Table S1. Percentage of main metal elelements (Cu, Ni, W) of the as synthesized catalysts (determined from XPS data)

Catalyst	Cu (atomic wt%)	Ni (atomic wt%)	W (atomic wt%)
0.05 Ni-$CuWO_4$@g-C_3N_4	0.6%	0.5%	0.9%
0.1 Ni-$CuWO_4$@g-C_3N_4	1.2%	0.8%	1.5%
0.2 Ni-$CuWO_4$@g-C_3N_4	1.7%	1.1%	1.8%
0.3 Ni-$CuWO_4$@g-C_3N_4	2.1%	1.6%	1.9%
0.4 Ni-$CuWO_4$@g-C_3N_4	2.8%	1.7%	2.2%

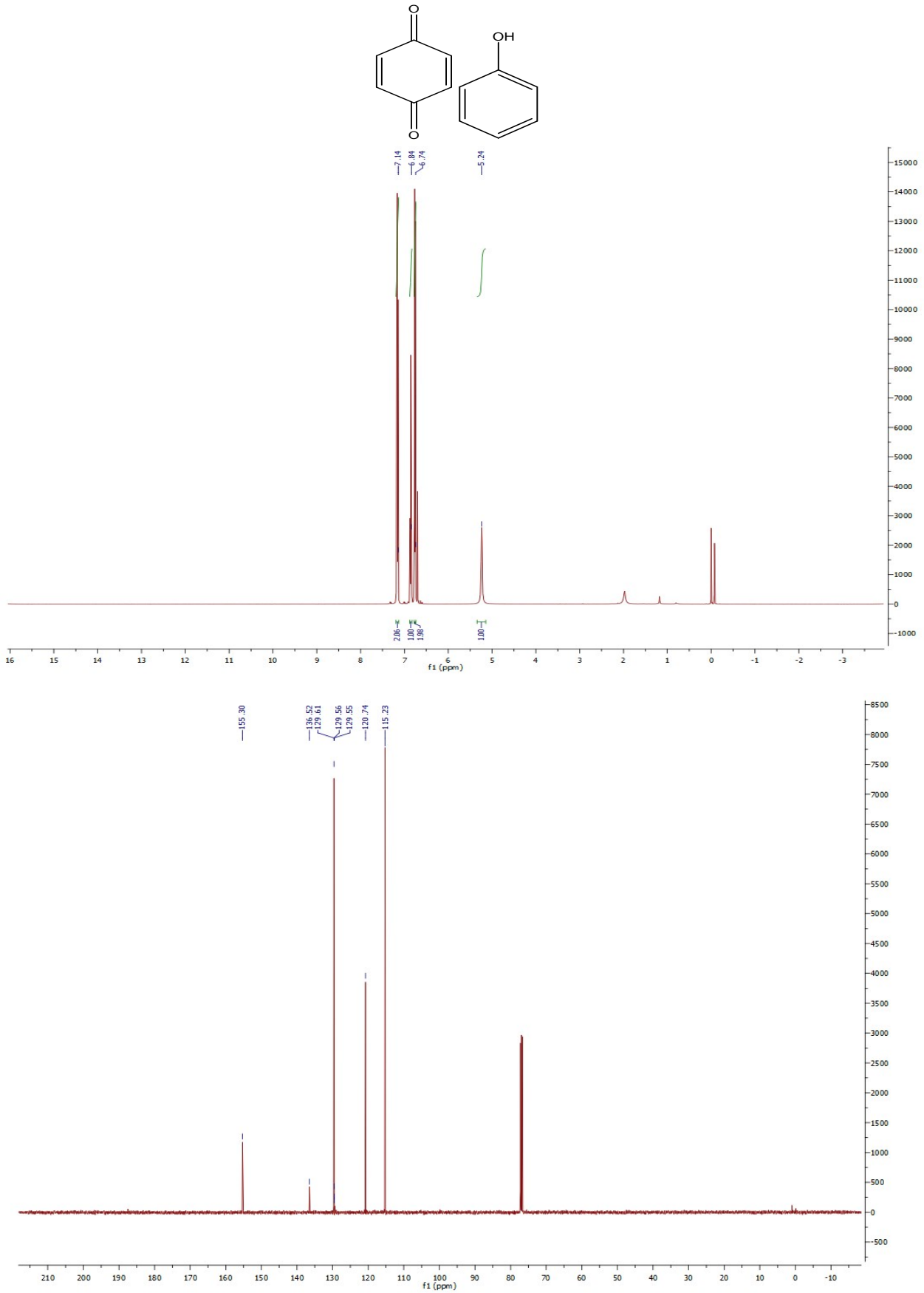

Figure S4. [1]H NMR and [13] NMR of products phenol and p-Benzoquinone

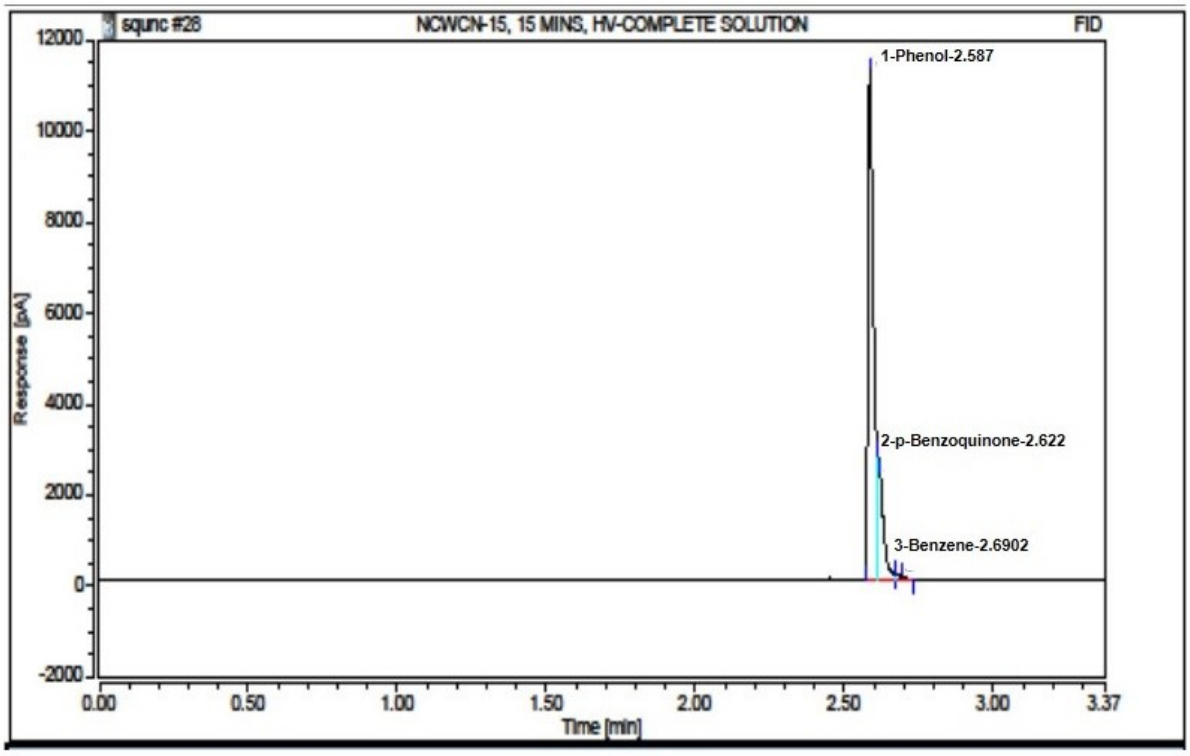

Figure S5. GC-FID analysis of reaction mixture at optimised reaction condition: 0.2 Ni-$CuWO_4$/g-C_3N_4 catalyst (20 mg), benzene (1 mL, 11.3 mmol), H_2O (0.2 mL), H_2O_2 (0.5 mL), 15 min, sunlight irradiation

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GRAPHICAL ABSTRACT