Supporting Information

Deposition of Pd Nanoparticles on 2D Ni-Fe-MOF Ultrathin Nanosheets for Efficient N-Alkylation of Amines by Alcohols under Visible Light

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Figure S1. GC graphs of standard materials and the product after the reaction (a) aniline (b) benzaldehyde; (c) N-benzylideneaniline; (d) N-benzylaniline; (e) filtrate obtained after 12h of reaction over 2 wt% Pd/Ni-Fe-MOF NSs.

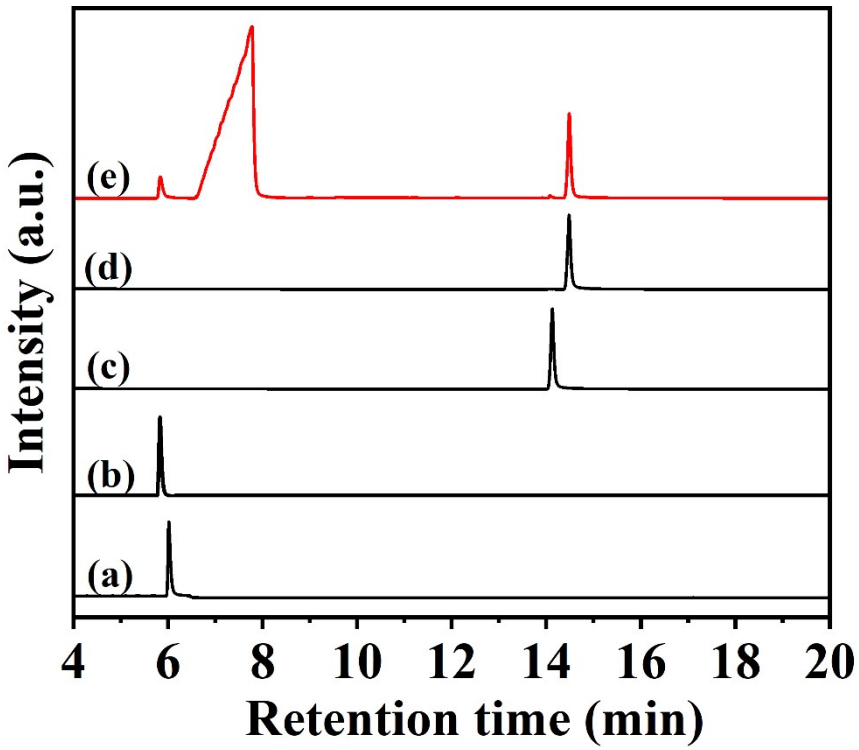


Figure S2. Mass spectrum of the product from aniline with benzyl alcohol.

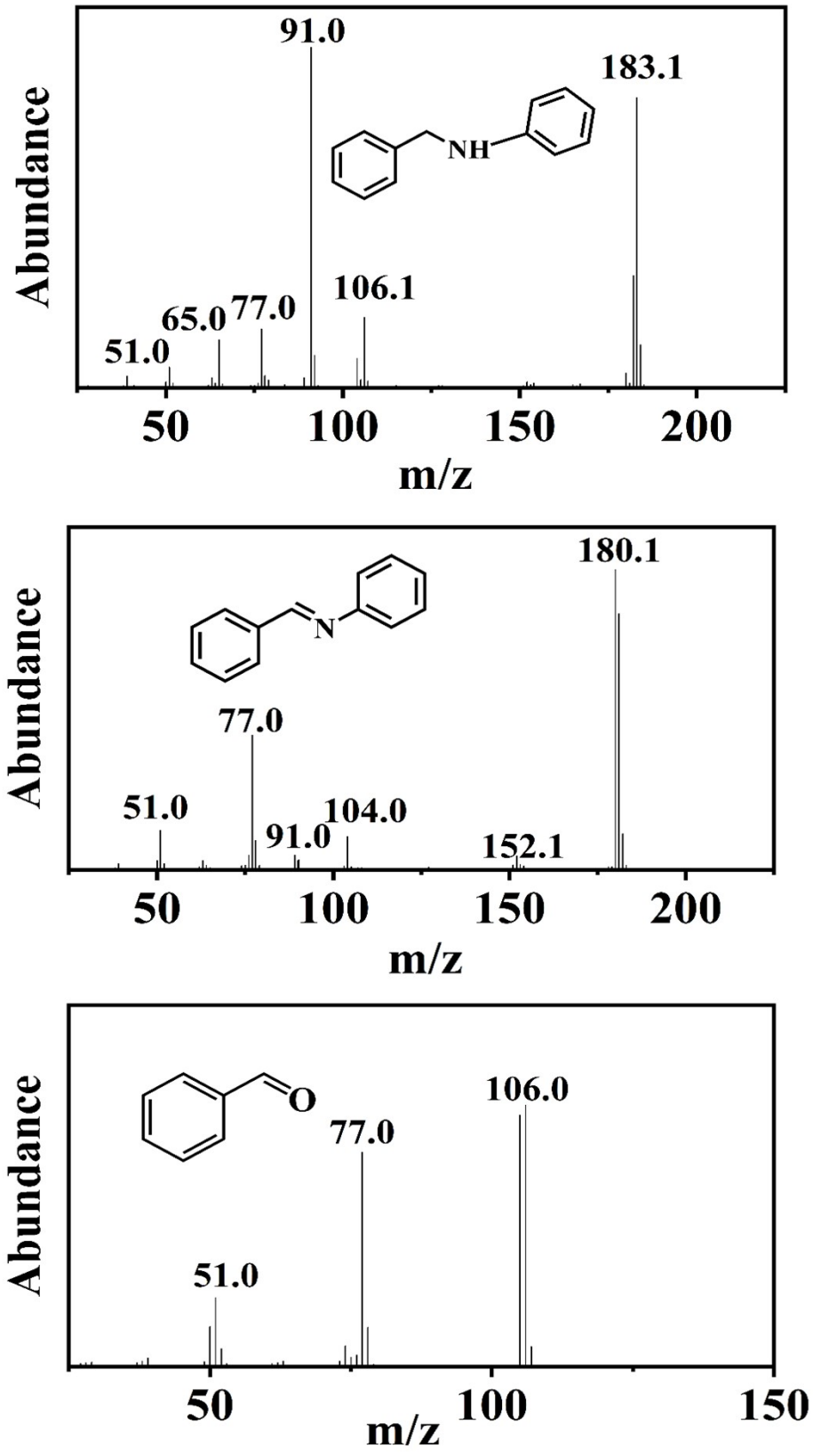


Figure S3. Mass spectrum of the product from *p*-methoxyaniline with benzyl alcohol.

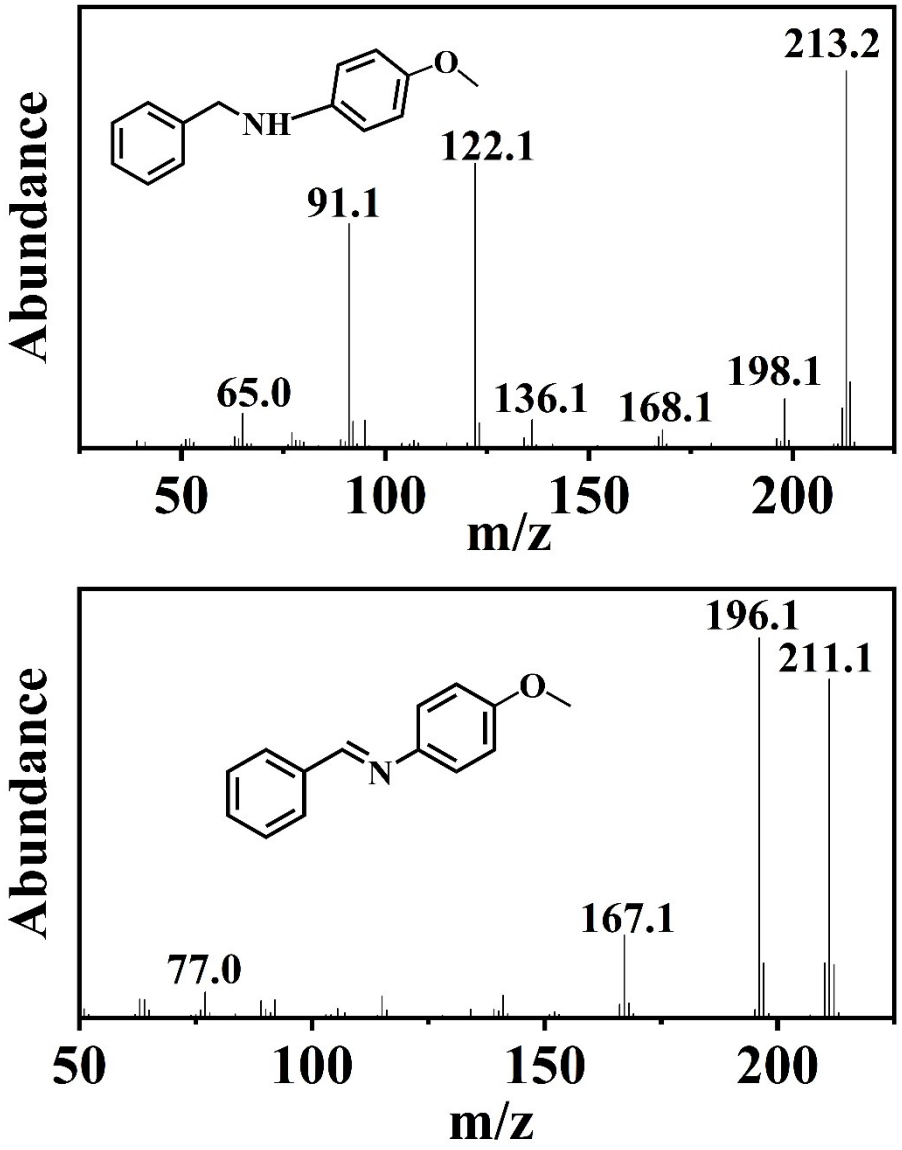


Figure S4. Mass spectrum of the product from *p*-touidine with benzyl alcohol.

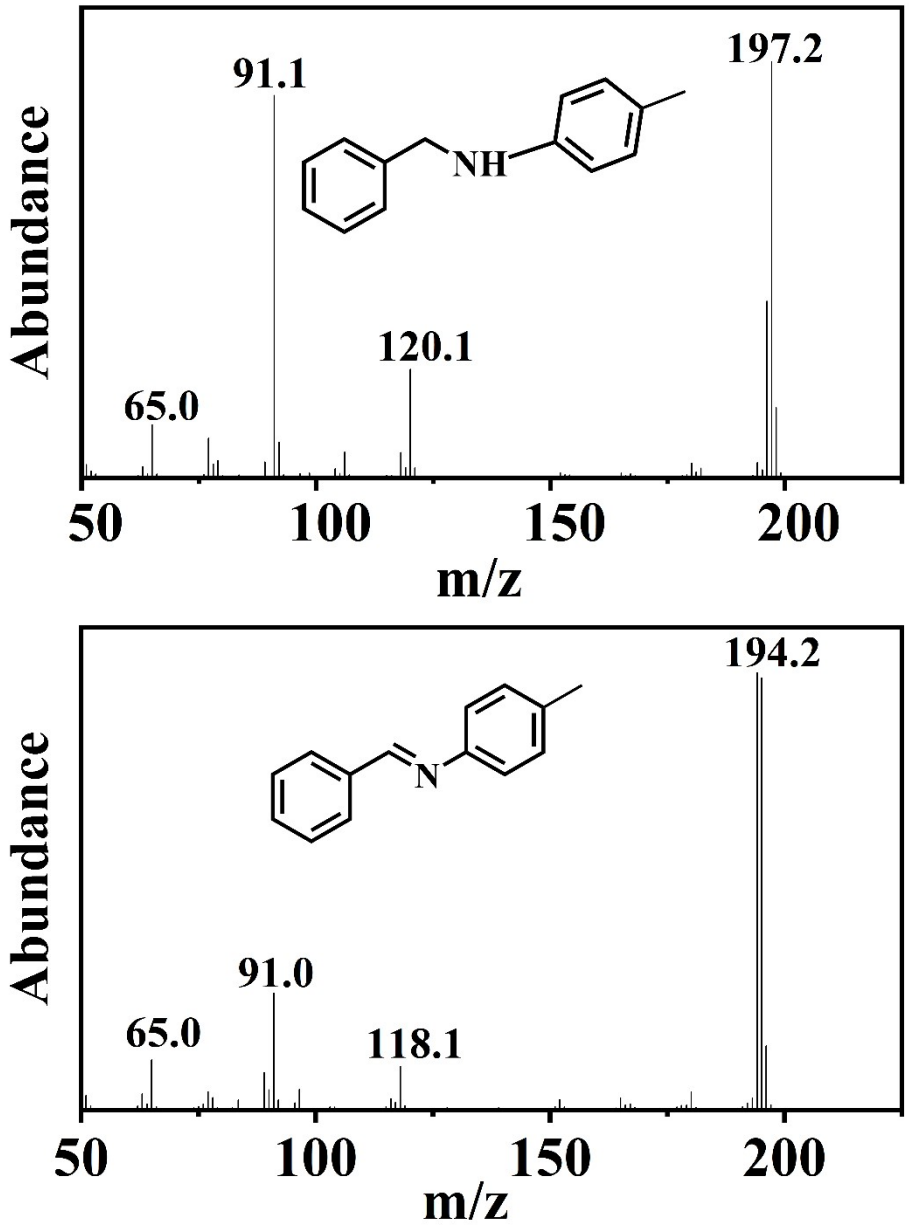


Figure S5. Mass spectrum of the product from *p*-chloroaniline with benzyl alcohol.

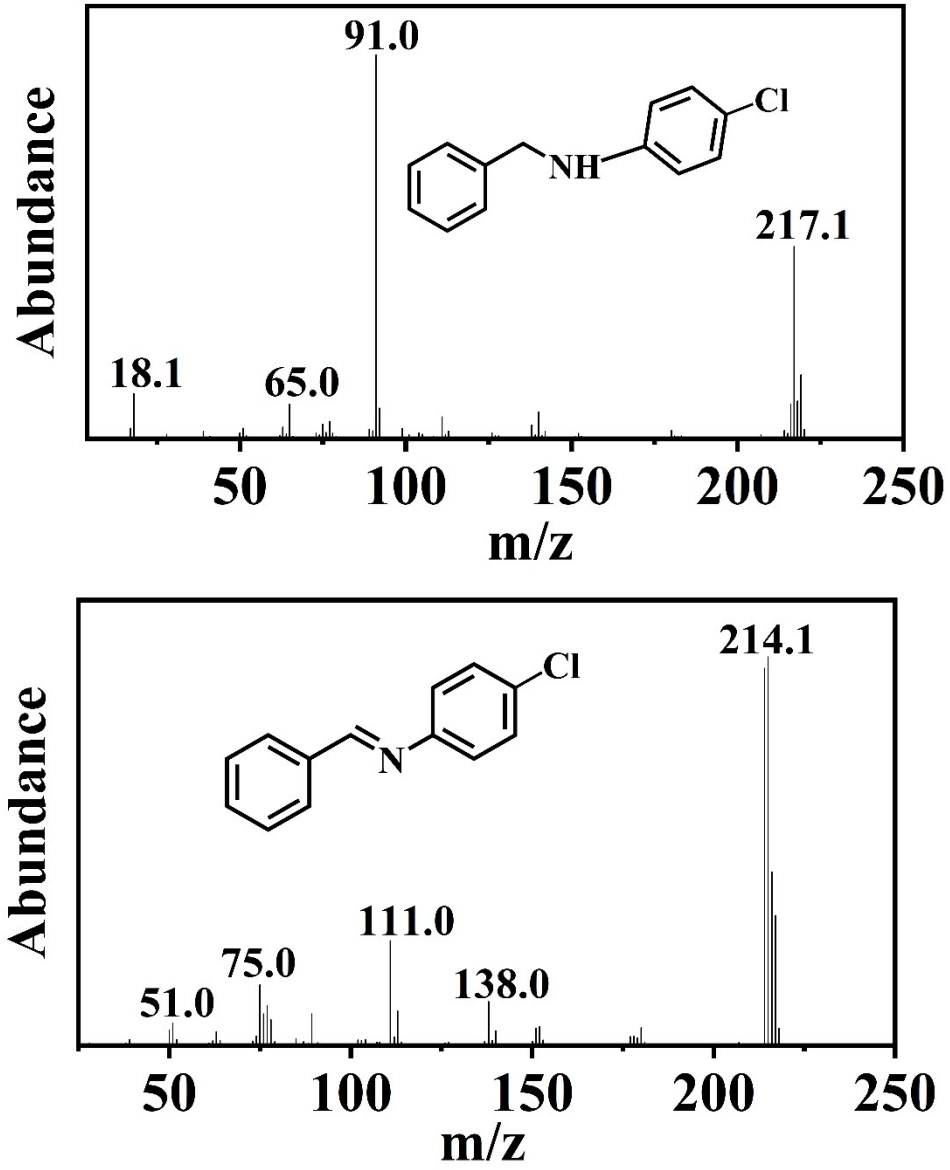


Figure S6. Mass spectrum of the product from aniline with *p*-methoxybenzyl alcohol.

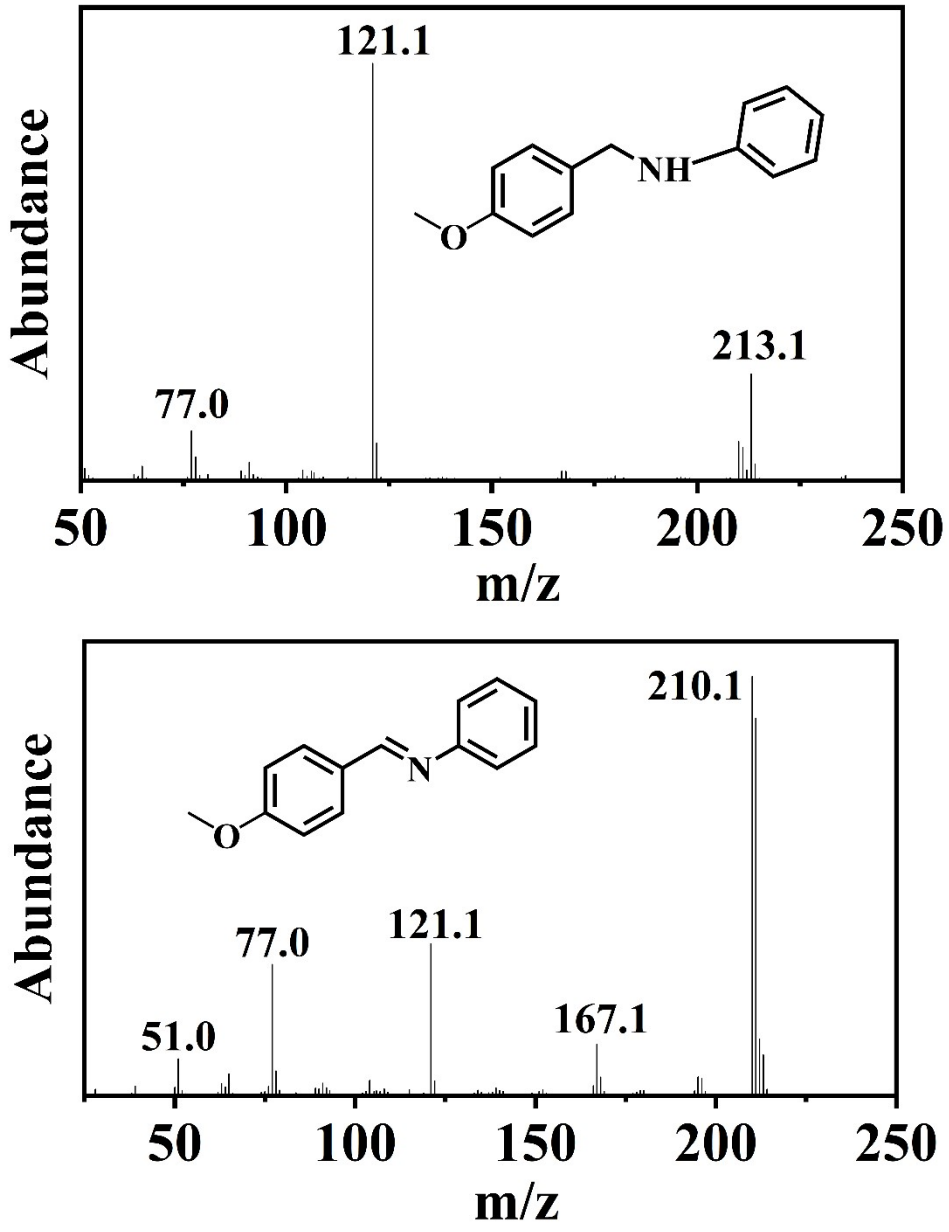


Figure S7. Mass spectrum of the product from aniline with *p*-methylbenzyl alcohol.

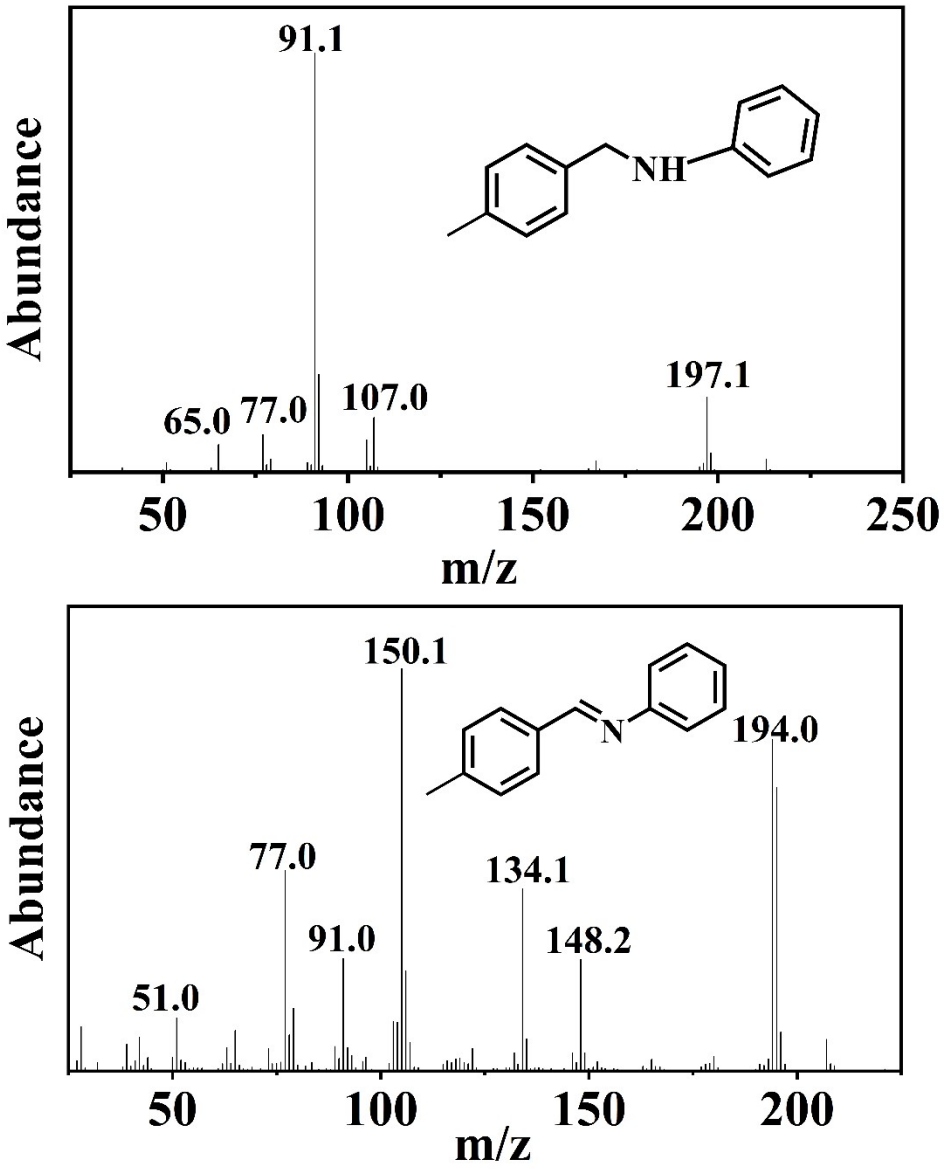


Figure S8. Mass spectrum of the product from aniline with *m*-methylbenzyl alcohol.

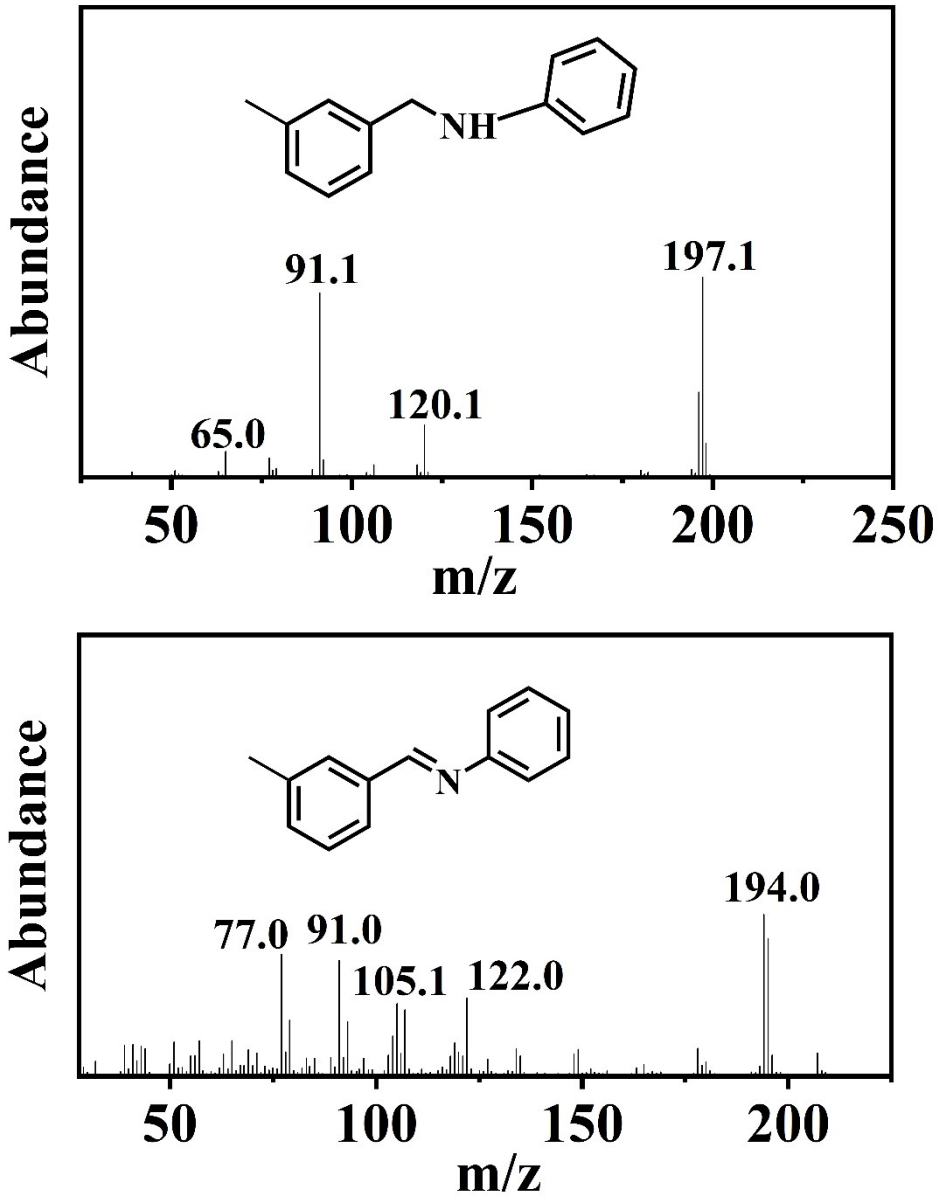


Figure S9. Mass spectrum of the product from aniline with *o*-methylbenzyl alcohol.

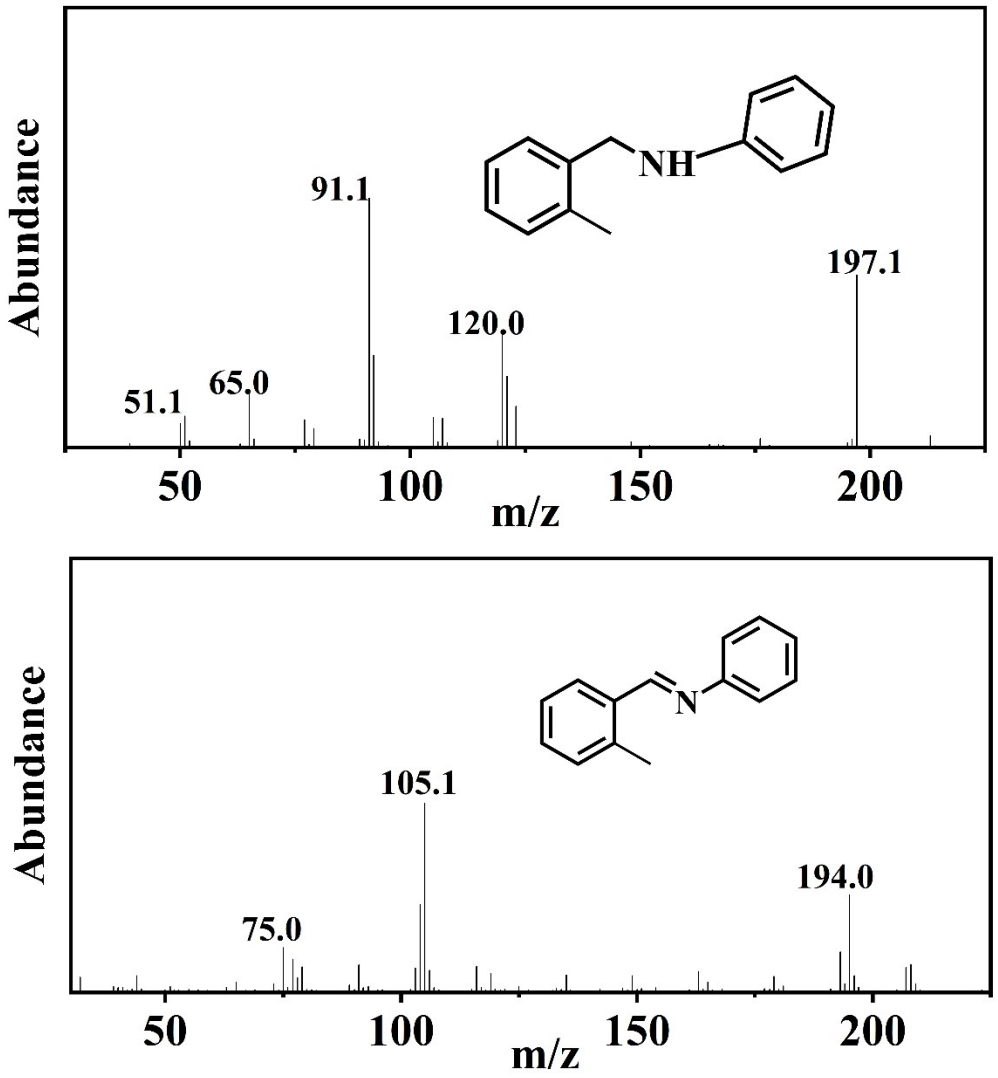


Figure S10. XPS spectra of Ni-Fe-MOF NSs (a) Fe 2p, (b) Ni 2p, and (c) S 2p.

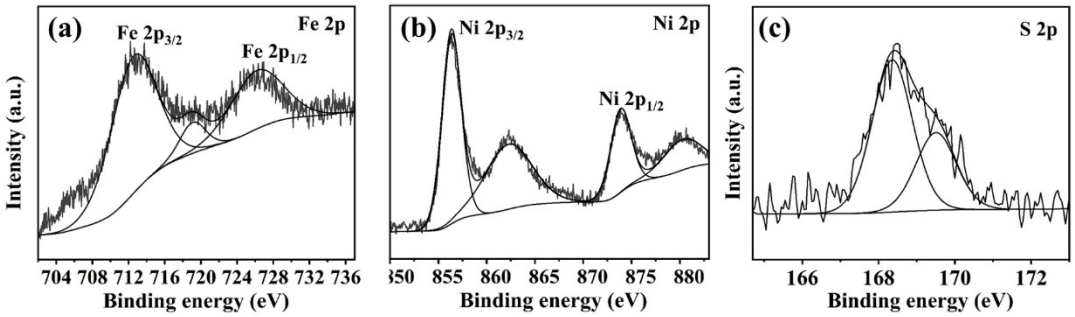


Figure S11. FT-IR spectra of prepared Ni-Fe-MOF NSs.

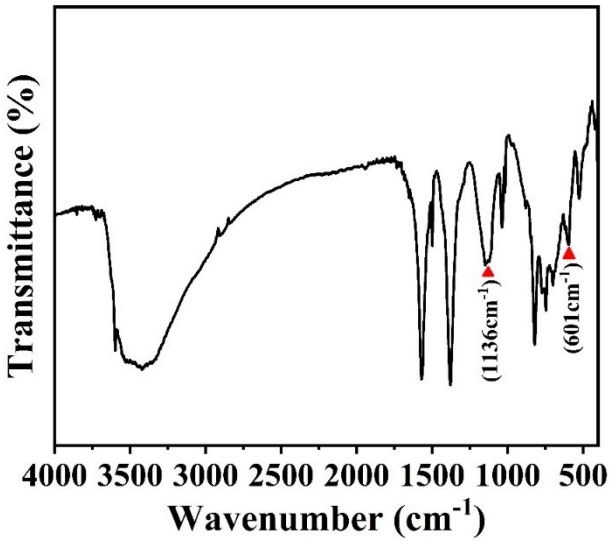


Figure S12. Mott-Schottky plots of Ni-Fe-MOF NSs.

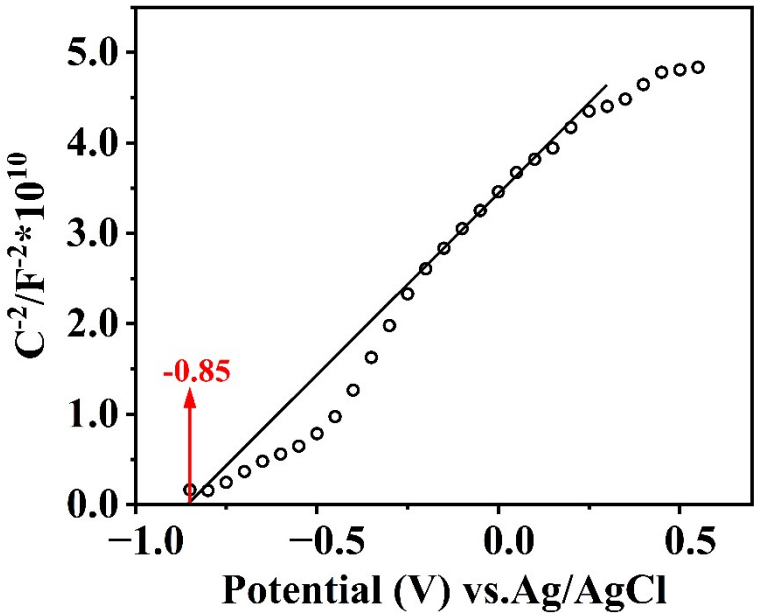


Figure S13. XRD patterns of (a) *x* wt% Pt/Ni-Fe-MOF NSs (*x* = 1, 2, 4), (b) *x* wt% Au /Ni-Fe-MOF NSs (*x* = 1, 2, 4), (c) *x* wt% Ag /Ni-Fe-MOF NSs (*x* = 1, 2, 4).

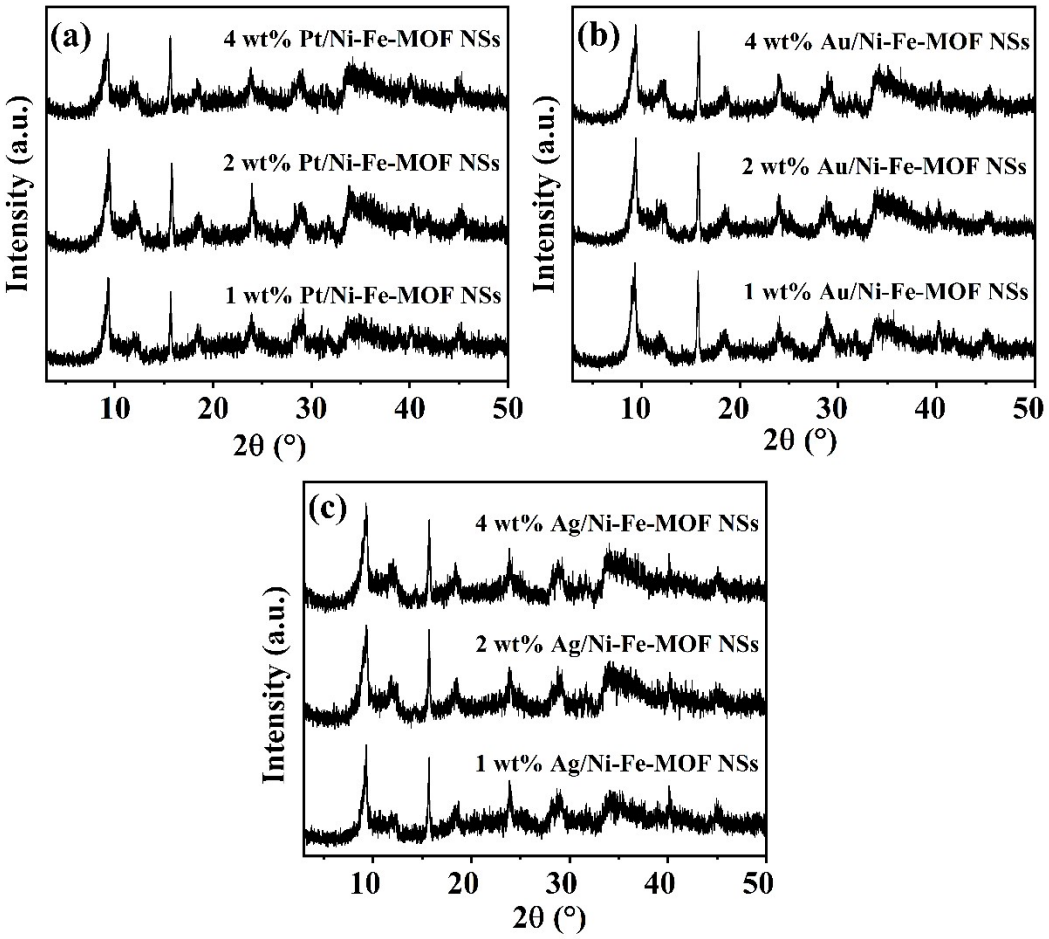


Figure S14. XRD patterns of 2 wt% Pd/bulk Ni-Fe-MOF.

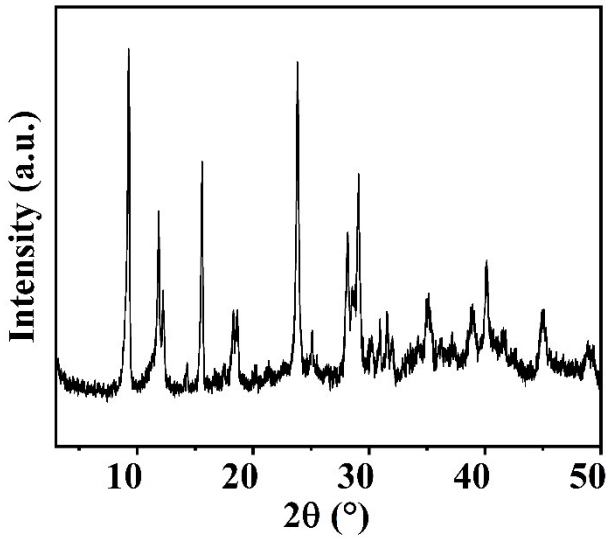


Figure S15. SEM images of 2 wt% Pd/bulk Ni-Fe-MOF.

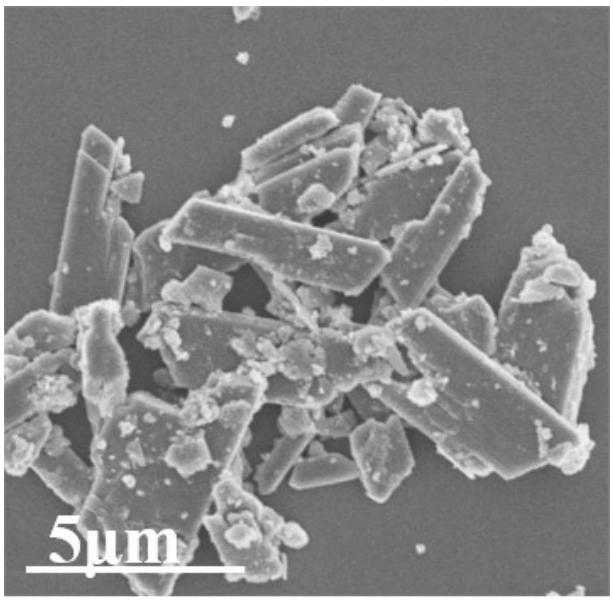


Figure S16. (a) Photoluminescence (PL) spectroscopy 2 wt% Pd/Ni-Fe-MOF NSs and 2 wt% Pd/bulk Ni-Fe-MOF, (b) Fluorescent lifetimes spectroscopy 2 wt% Pd/Ni-Fe-MOF NSs and 2 wt% Pd/bulk Ni-Fe-MOF.

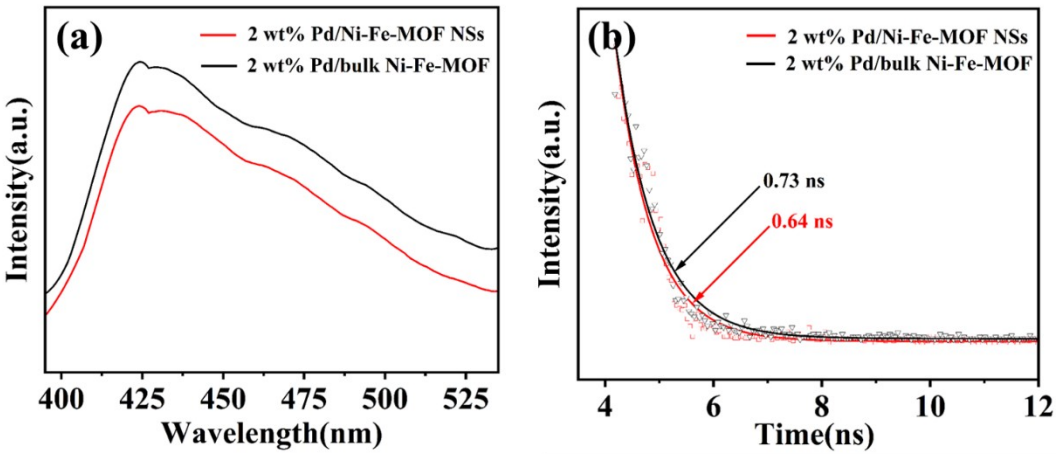


Figure S17. (a) Time-dependent changes in the amounts of aniline over 2 wt% Pd/Ni-Fe-MOF NSs and 2 wt% Pd/bulk Ni-Fe-MOF in reaction systems, (b) TPD spectra of 2 wt% Pd/Ni-Fe-MOF NSs and 2 wt% Pd/bulk Ni-Fe-MOF pre-adsorbed with aniline and benzyl alcohol to saturation.

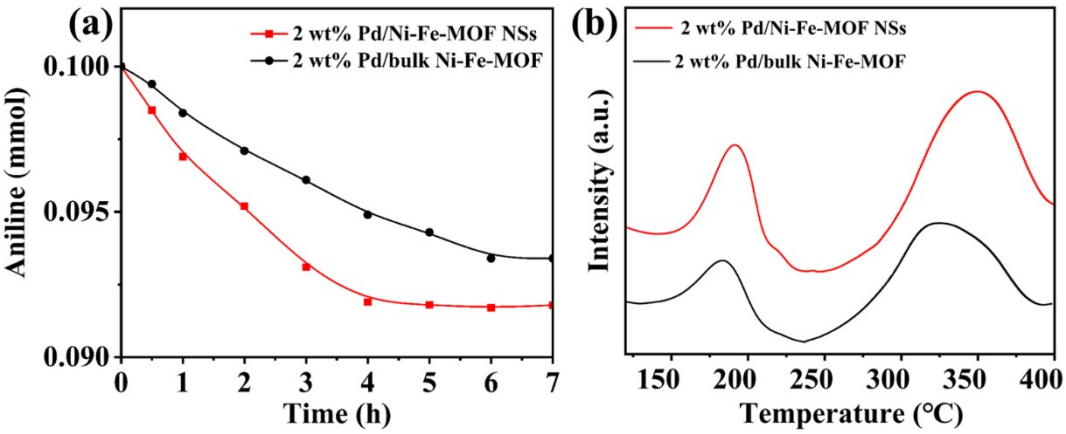


Figure S18. XRD patterns of 2 wt% Pd/Ni-Fe-MOF NSs before and after the reaction.

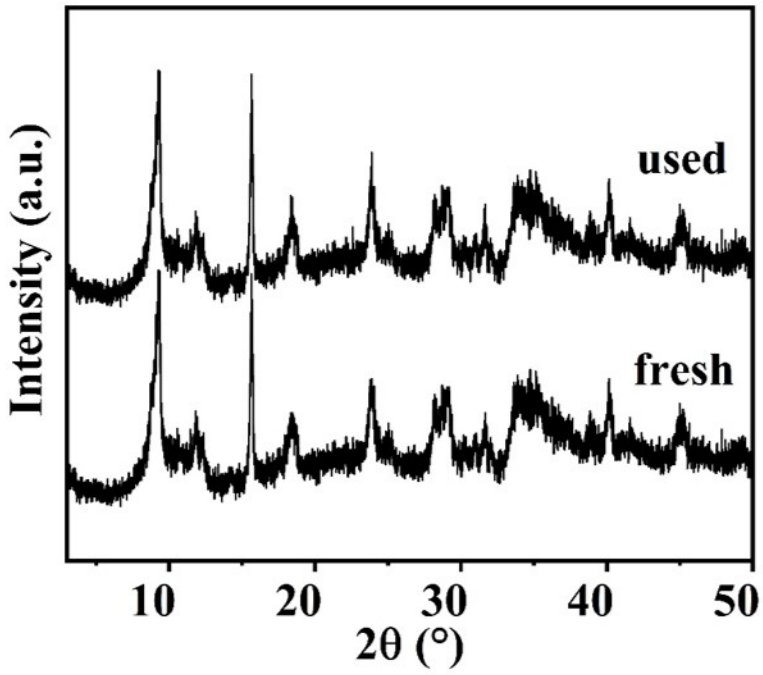
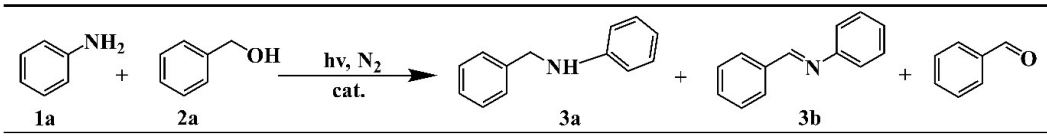


Table S1. Light-induced catalytic performance for N-alkylation of aniline with benzyl



1a 2a 3a 3b

Entry	Catalyst	Conv. [%][a)]	Yield [%]		Aldehyde [μmol]
			3a	3b	
1	1wt%Pt/Ni-Fe-MOF NSs	29	8	14	14
2	2wt%Pt/Ni-Fe-MOF NSs	64	26	31	59
3	4wt%Pt/Ni-Fe-MOF NSs	35	11	21	32
4	1wt%Au/Ni-Fe-MOF NSs	14	5	6	19
5	2wt% Au/Ni-Fe-MOF NSs	45	3	38	61
6	4wt% Au/Ni-Fe-MOF NSs	29	8	14	14
7	1wt% Ag/Ni-Fe-MOF NSs	17	3	8	12
8	2wt%Ag/Ni-Fe-MOF NSs	32	9	19	30
9	4wt%Ag/Ni-Fe-MOF NSs	34	9	20	30

Reaction conditions: aniline (0.1 mmol), benzyl alcohol (2 mL), catalyst (10 mg), N_2, 3 W bule LED visible light 12h. [a)] Conv. was calculated based on **1a**.

alcohol under different conditions.