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

Supporting information

Direct synthesis of imines from nitro compounds and biomass-derived carbonyl compounds over nitrogen-doped carbon materials supported Ni nanoparticles

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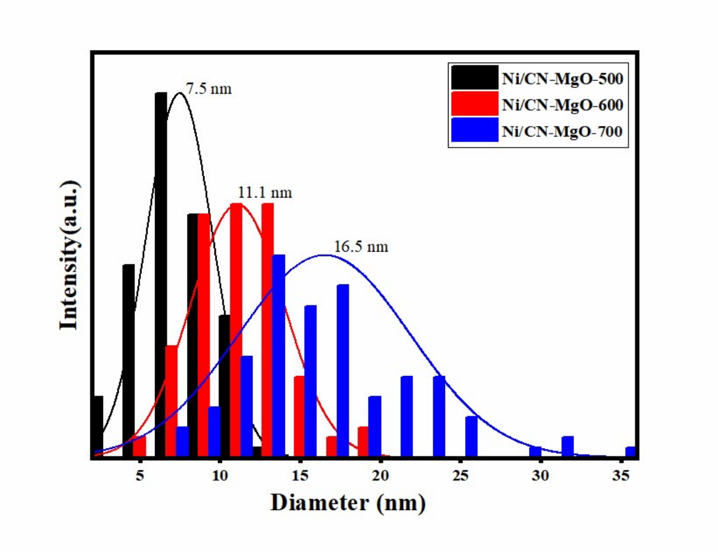
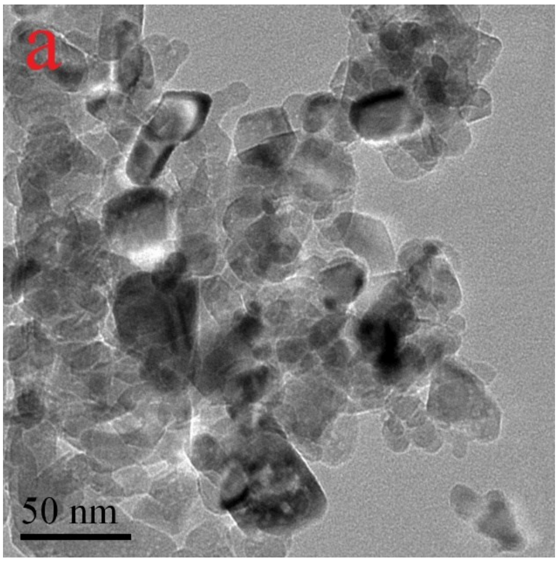


Fig. S1 Particle size distributions for the Ni/CN-MgO-T



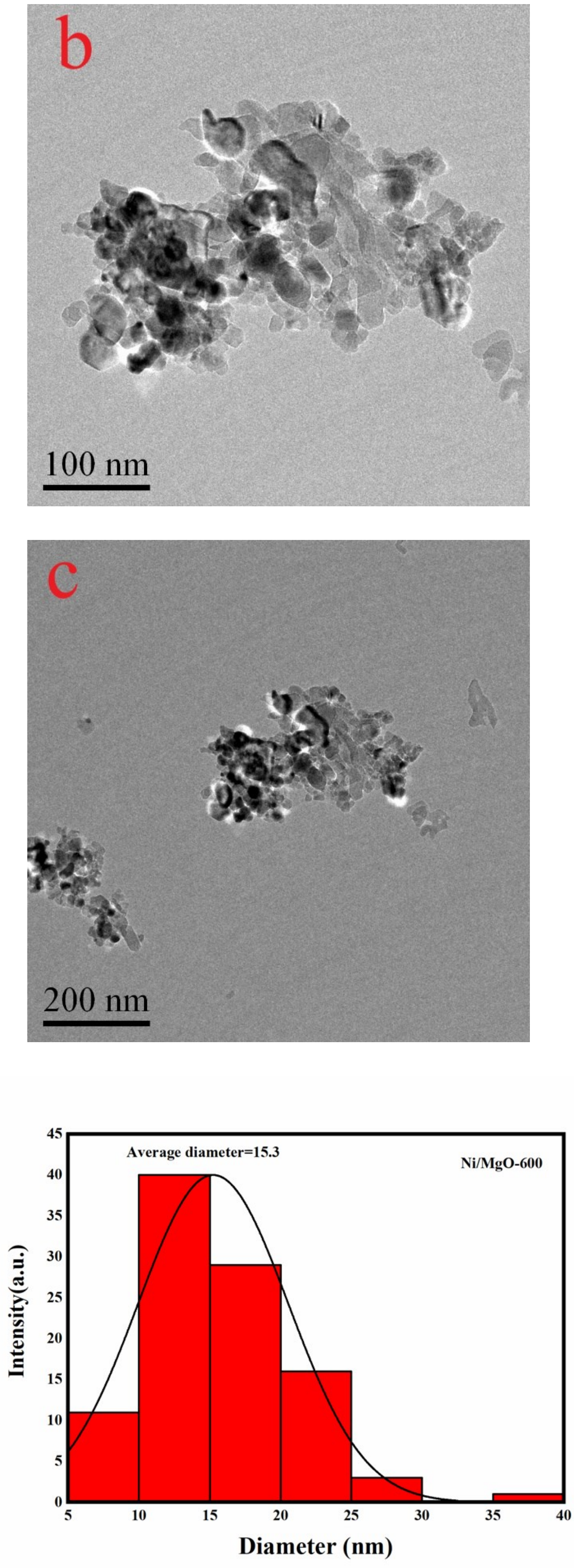


Fig. S2 TEM(a,b,c) and Particle size distributions for the Ni/ MgO-600

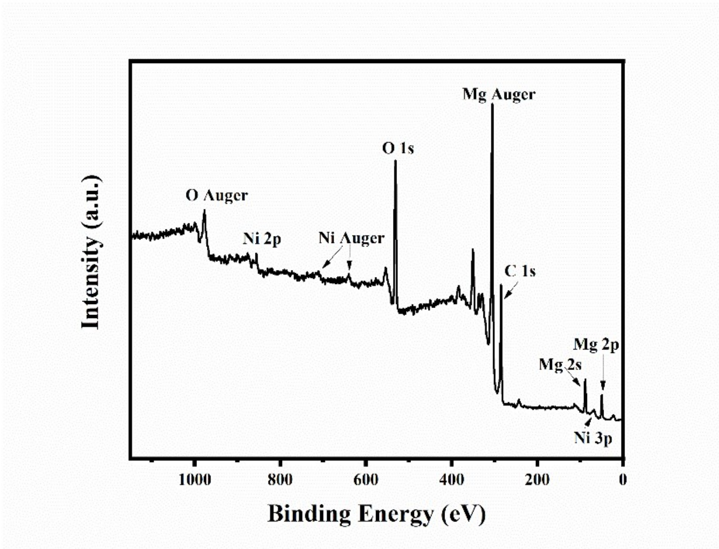
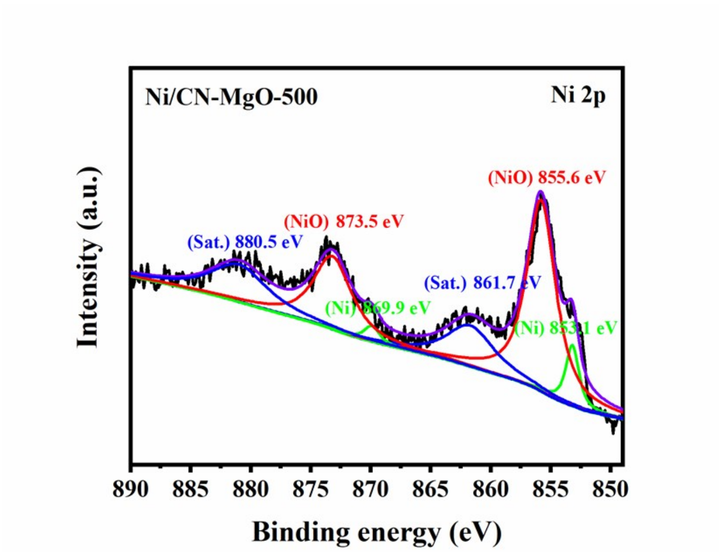


Fig. S3 XPS survey scan of the Ni/CN-MgO-600 catalyst



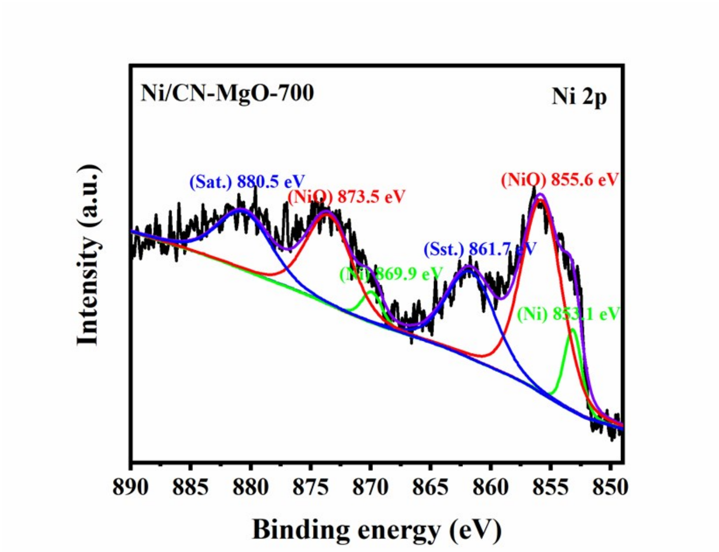
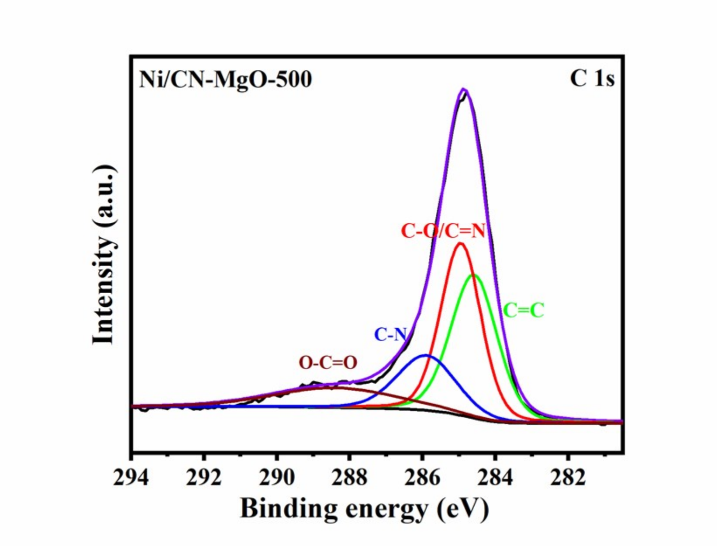


Fig. S4 XPS spectra of Ni 2p in the Ni/NC-MgO-500 and Ni/CN-MgO-700 catalysts



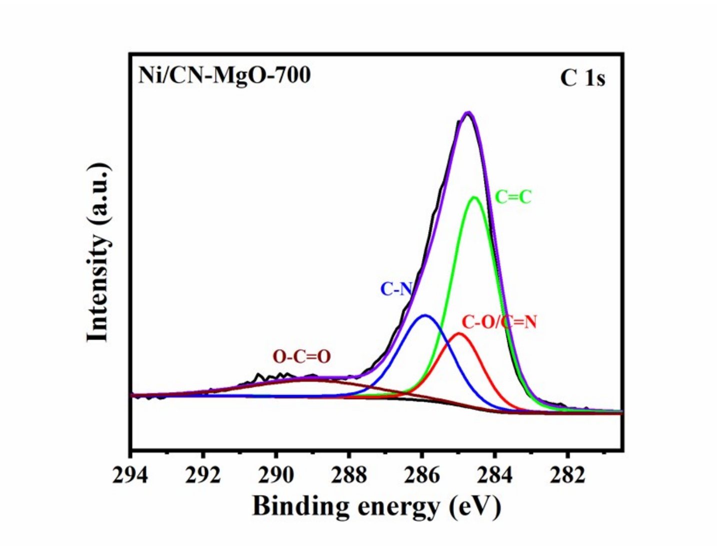
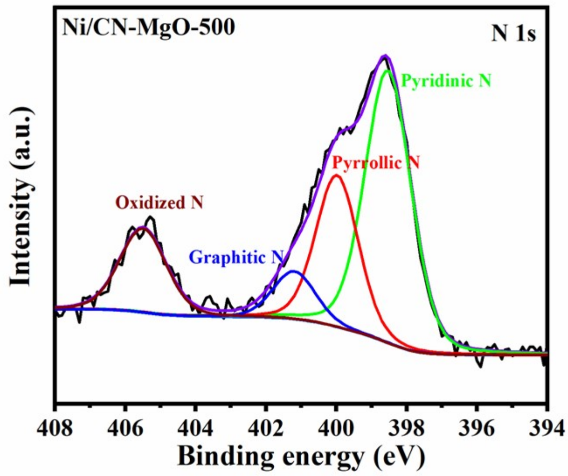


Fig. S5 XPS spectra of C 1s in the Ni/NC-MgO-500 and Ni/CN-MgO-700 catalysts

Table S1. The percentage of different carbon in the Ni/CN-MgO-T catalysts.

Entry	Samples	O-C=O	C-N	C-O/C=N	C=C
1	Ni/CN-MgO-500	12.7%	16.7%	36.0%	34.6%
2	Ni/CN-MgO-600	11.1%	19.2%	29.0%	40.7%
3	Ni/CN-MgO-700	10.7%	22.8%	16.4%	50.1%



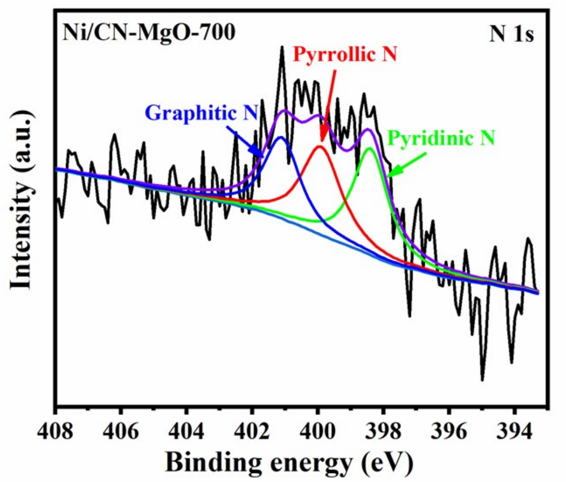
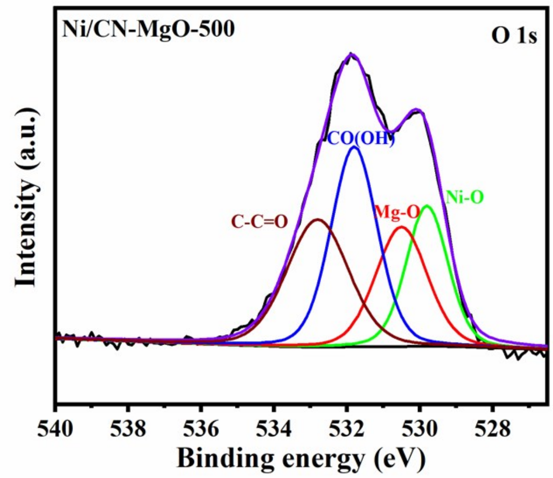


Fig. S6 XPS spectra of N 1s in the Ni/NC-MgO-500 and Ni/CN-MgO-700 catalysts

Table S2. The percentage of different nitrogen in the Ni/CN-MgO-T catalysts

Entry	Samples	Pyridinic N	Pyrrolic N	Graphitic N	Oxidized N
1	Ni/CN-MgO-500	50.4%	25.7%	8.2%	15.7%
2	Ni/CN-MgO-600	49.6%	32.4%	18.0%	-
3	Ni/CN-MgO-700	32.2%	37.6%	30.2%	-



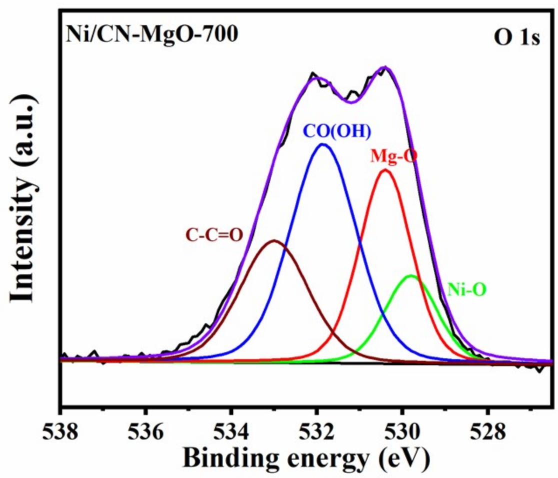


Fig. S7 XPS spectra of O 1s in the Ni/NC-MgO-500 and Ni/CN-MgO-700 catalysts

Table S3. The percentage of different oxygen in the Ni/CN-MgO-T catalysts

Entry	Samples	Ni-O	Mg-O	CO(OH)	C-C=O
1	Ni/CN-MgO-500	20.1%	21.1%	31.8%	27.0%
2	Ni/CN-MgO-600	16.6%	22.8%	35%	25.6%
3	Ni/CN-MgO-700	12.3%	26.9%	38.7%	22.1%

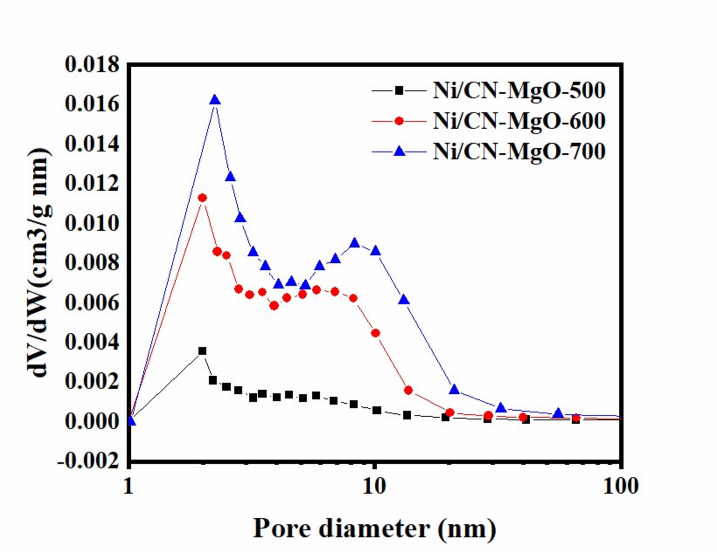


Fig. S8 pore size distributions of the Ni/CN-MgO-T catalysts

Table S4. The texture properties of the as-prepared catalysts.

Entry	Samples	S_{BET} (m^2 g^{-1})	Pore Volume[a] (cm^3 g^{-1})	Pore Size[b] (nm)
1	Ni/CN-MgO-500	35.5	0.039	14.0
2	Ni/CN-MgO-600	181.0	0.107	7.67
3	Ni/CN-MgO-700	171.2	0.214	10.4

Table S5. The comparison between other catalysts and our Ni/CN-MgO catalyst.

Entry	Catalyst	Condition	Compared
1	Au/TiO_2[1]	25 ℃, 1 mmol H_2O, 5 atm CO	The use of precious metals as precursors makes the catalyst expensive.
2	$Au–Pd/Al_2O_3$[2]	140 ℃, 2 MPa Ar, 40 mL methanol, 10 mL H_2O, 0.5 g cat	The use of precious metals to prepare the catalyst increases the cost of the catalyst. It is also a bimetallic catalyst. At the same time, the temperature condition of the reaction is also harsh.
3	CoOx@NC-800[3]	110 °C, 5.0 MPa H_2, THF (3.2 mL), H_2O (0.8 mL), 24 h	The reaction conditions are harsh such as temperature and pressure.
4	CoS_2@MoS_2[4]	60 °C, 1.5 MPa H_2	This reaction condition is indeed in compliance with environmental protection regulations, but its poor selectivity makes the

			separation work cost much.
5	PtCo/$CoBO_x$[5]	60 °C and 1 MPa H_2, 5mg Cat	The catalyst is prepared by using precious metals, and it is also a bimetallic catalyst, which is more complicated to prepare.
6	Ni_2Si/SiCN-1000[6]	170 ℃, 5 MPa H_2, 100 mg cat	The reaction conditions are very harsh such as reaction temperature and pressure.
7	Ni/SiO_2[7]	378 K, 1.4 MPa H_2, 15 mg cat	The preparation method of the catalyst is complicated.
8	Ni/SiO_2[8]	80 ℃, 1.4 MPa H_2, 5 mg cat	The preparation method of the catalyst is complicated.
9	Ni/CN-MgO-600	80 ℃, 1.0 MPa H_2, 20 mg cat.	Simple preparation method, economical source of materials.

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