Supporting Information

Nitrogen-Doped Carbon Quantum Dots-Decorated Mg-Al Layered Double Hydroxide Supported Gold Nanocatalysts for Efficient Base-free Oxidation of Benzyl Alcohol

Yujing Guo[1], Lipeng Fan[1], Mengran Liu, Lan Yang*, Guoli Fan, Feng Li*

State Key Laboratory of Chemical Resource Engineering, Beijing Advanced Innovation Center for Soft Matter Science and Engineering, Beijing University of Chemical Technology, No.15, Beisanhuan East Road, 100029, Beijing, China.

* To whom correspondence should be addressed.

Tel.: +8610-64451226; fax: +8610-64425385.

E-mail: yanglan@mail.buct.edu.cn (L. Yang); lifeng@mail.buct.edu.cn (F. Li).

[1] Y. Guo and L. Fan contributed equally to this work.

6 Figures and 1 Table.

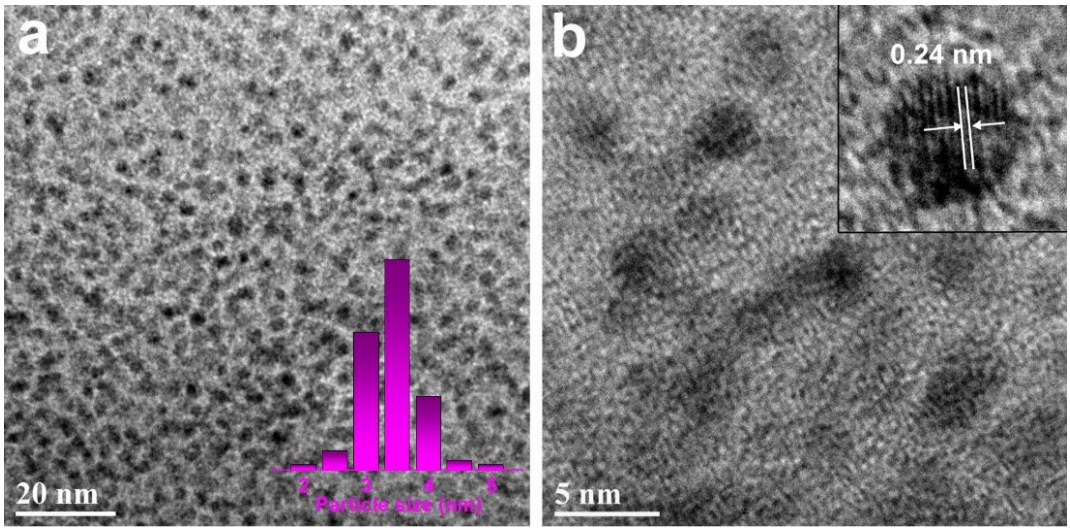

Figure S1 TEM (a) and HRTEM (b) images of NCDs. Insets in (a) and (b) are the histogram of the size distribution of NCDs and the HRTEM image of a single NCD, respectively.

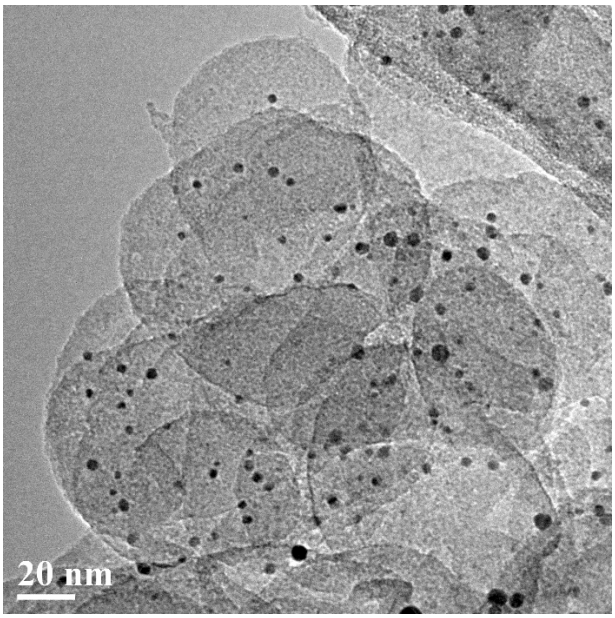

Figure S2 TEM image of Au/MgAl-LDH sample.

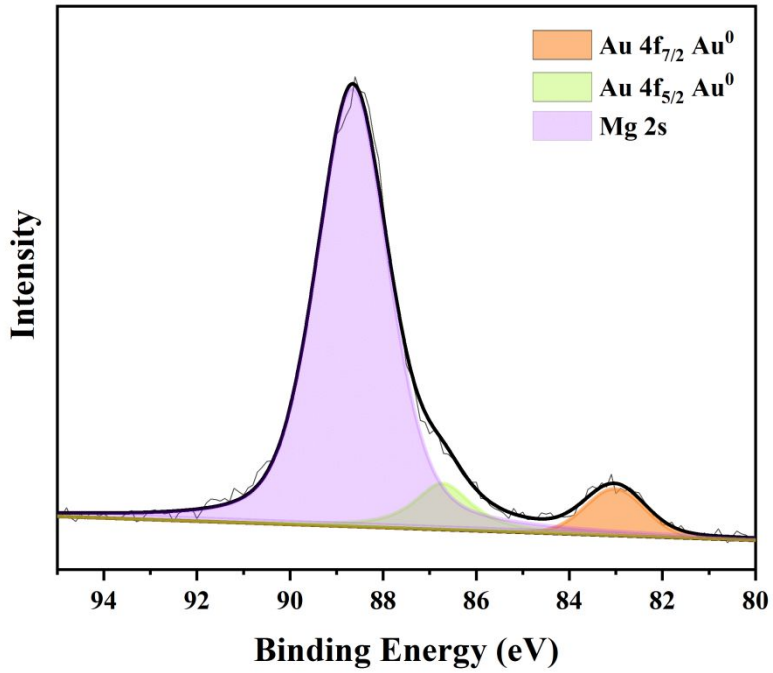

Figure S3 XPS of Au 4f region of Au/MgAl-LDH sample.

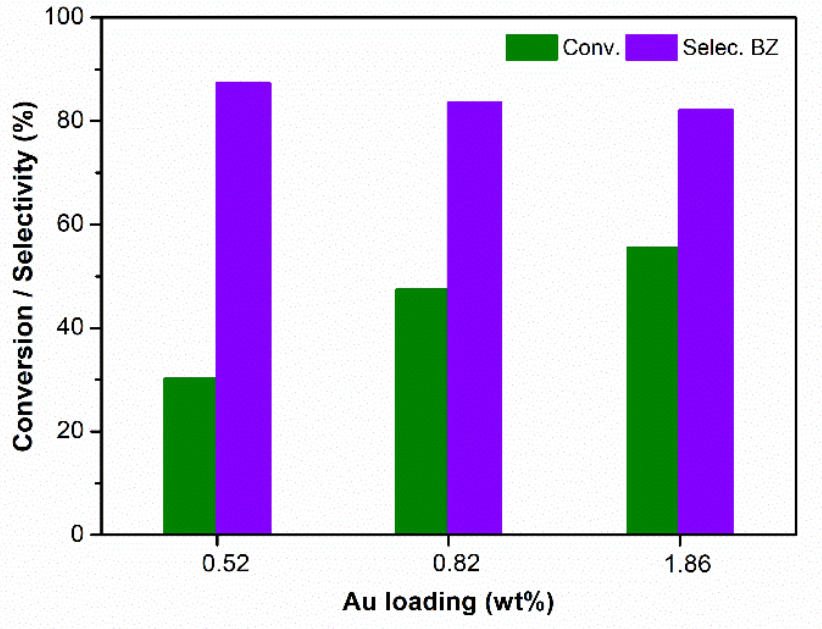

Figure S4 Effect of the Au loading amount on the BA conversion and BZ selectivity over the Au/NCD/MgAl-LDH. Reaction conditions: reaction temperature, 120 °C; oxygen partial pressure, 0.4 MPa; reaction time, 4h.

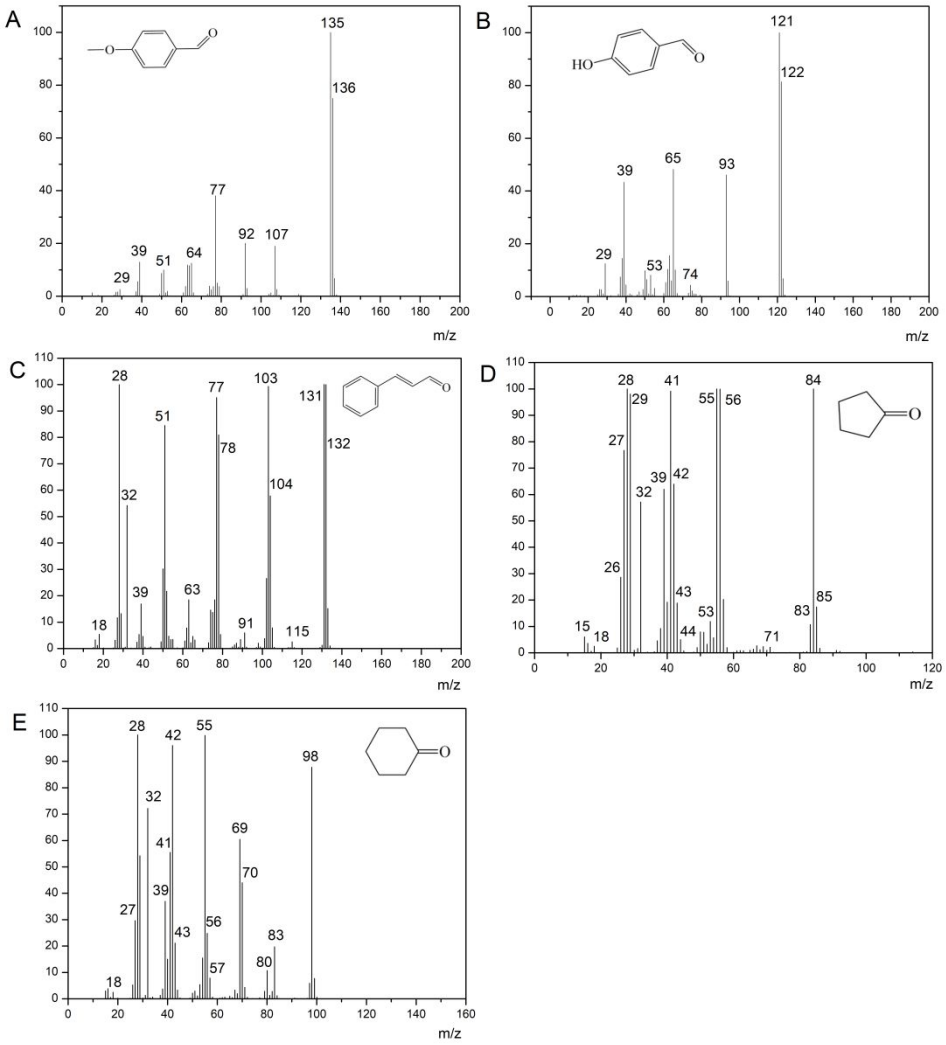

Figure S5. GC-MS spectra of main oxidation products obtained in Table 3 from *p*-methoxybenzyl alcohol to *p*-methoxybenzaldehyde (A), from *p*-hydroxybenzyl alcohol to *p*-hydroxybenzaldehyde (B), from cinnamyl alcohol to cinnamic aldehyde (C), from cyclopentanol to cyclopentanone (D), and from cyclohexanol to cyclohexanone (E).

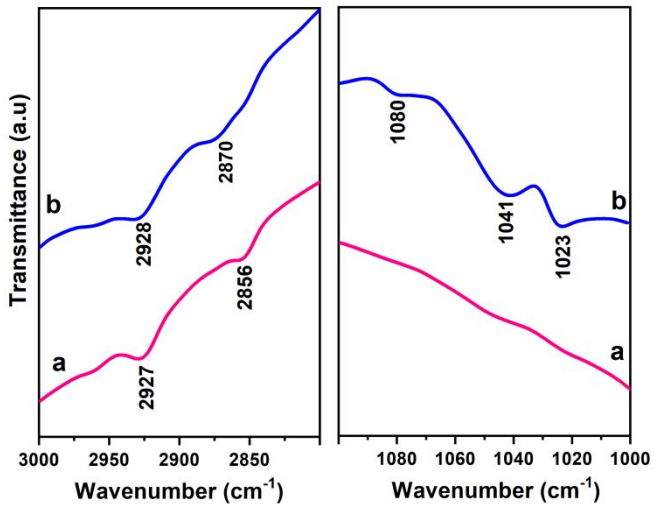

Figure S6 FT-IR spectra of BA absorption on Au/MgAl-LDH (a) and Au/NCD/MgAl-LDH (b).

Table S1 Catalytic performance for the oxidation of BA over different catalysts [a]

Catalyst	Au (wt%)	Temp. (°C)	Solvent	Substrate (mmol)	Time (h)	Conv. (%)	Select. BZ (%)	TOF (h^{-1})	Refs
Au/ZMA-15	0.81	120	no	89.00	4	40.2	99.10	5382	[61]
Au/CeSnO [b]	1.21	100	toluene	4.0	3	42.3	>99	316.8	[62]
Au/Al_2O_3 [b]	0.27	50	toluene	53.35	3	33	100	5860	[63]
Au/CeO_2 [c]	1.0	120	no	18.50	4	3.7	94.0	N.A.	[64]
Au/TiO_2 [d]	1.0	160	no	355.7	6	55	73.7	6348	[65]
Au/C [e]	1.0	120	no	355.7	6	6.6	63.9	1676	[66]
Au/MgAl-LDH	0.91	120	no	89.00	4	38.2	84.5	8591	This work
Au/NCD/MgAl-LDH	0.82	120	no	89.00	4	47.3	85.5	20175	This work

[a] Catalyst = 100 mg, oxygen pressure = 0.4 MPa; [b] Solvent=4 mL, catalyst =100 mg; [c] Catalyst = 0.05 g; [d] Catalyst = 0.1 g; [e] BA/metal molar ratio = 250:1.