Journal Name

ARTICLE

Supporting information

From Ureidopyrimidinone Containing Organic Precursor to Excavated Iron-Nitrogen Codoped Hierarchical Mesoporous Carbon (Ex-FeN-MC) as Efficient Bifunctional Electrocatalyst

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Figure caption

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Table 1 Comparison of precious transition metals benchmark catalysts in alkaline media

Table 2 Elemental and species composition of Ex-FeN-MC

Table 3 Elemental and species composition of Ex-FeN-MC at different temperatures

1. NMR spectrum of MIMIS

We have used the ^{1}H -NMR spectra to confirm the formation of pure mono isocyanato methyl isocytosine. All the protons were successfully assigned the peaks.

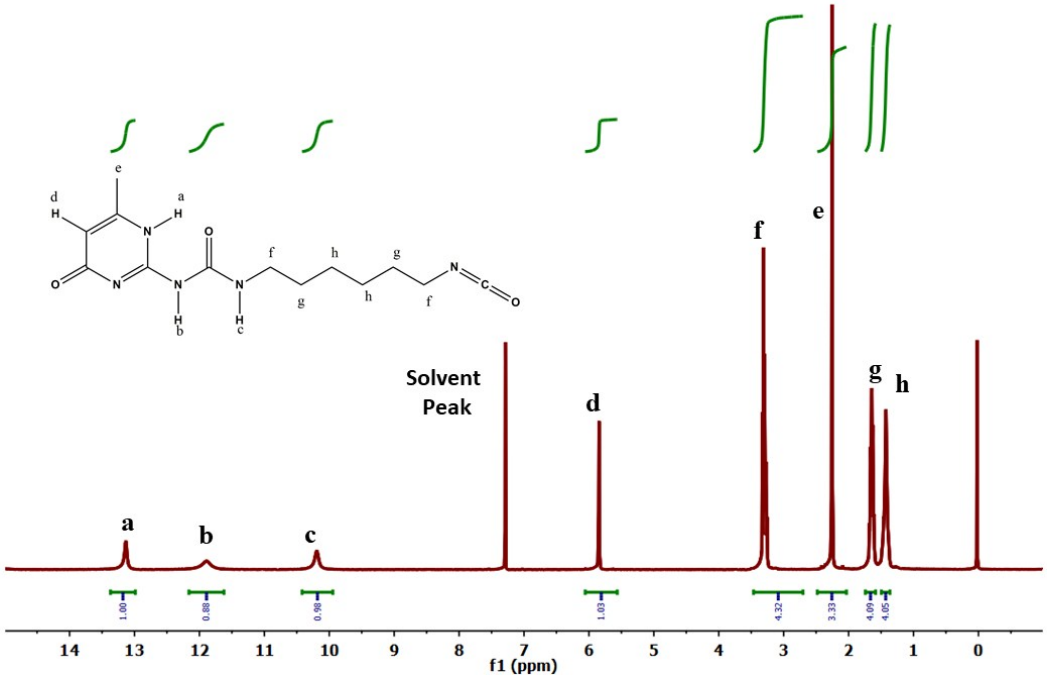

Fig. S1 ^{1}H-NMR spectrum of MIMIS

2. NMR spectrum of MAMIS

We have used the ^{1}H-NMR spectrum to confirm the formation of pure metha acrylate methyl isocytosine. All the protons were successfully assigned the peaks.

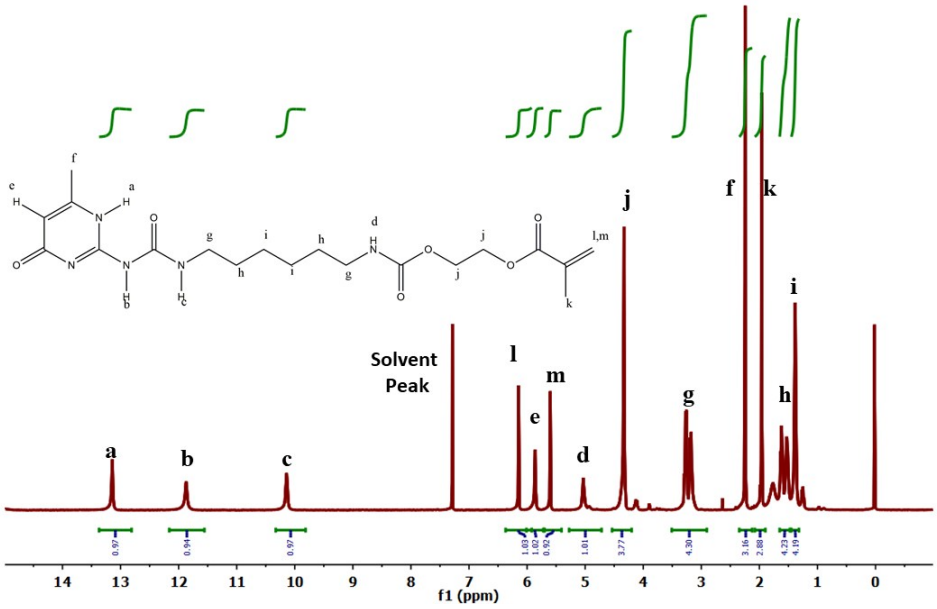

Fig. S2 ^{1}H-NMR spectrum of MAMIS

^{1}H-NMR 600MHz, $CDCl_3$, (1.37 t, 4H, i), 1.50 -1.61 (m, 4H, h), 1.94 (s, 3H, k), 2.23 (s, 3H, f), 3.10-3.2 (m, 4H, g), 4.32 (s, 4H, j), 5.00 (s, 1H, d), 5.58 (s, 1H, m), 5.84 (s, 1H, e), 6.13 (s, 1H, 1), 10.14 (s, 1H, e), 11.86 (s, 1H, 1, a).

3. MS Analysis of MAMIS

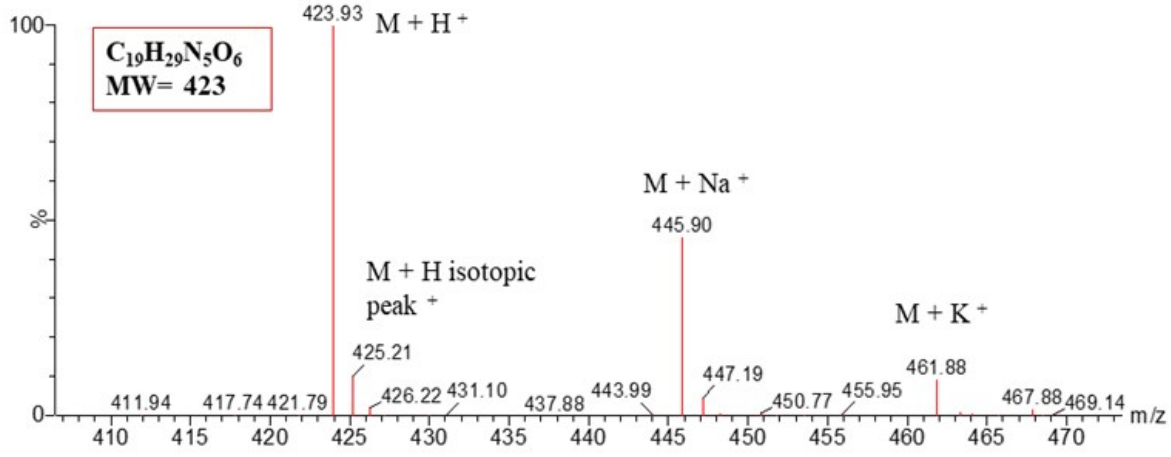

Fig. S3. Mass spectrum of MAMIS

The mass spectra show the characteristic peak of M^+H^+ at 423.93, which confirms the formation of MAMIS.

4. SEM image of silica particles

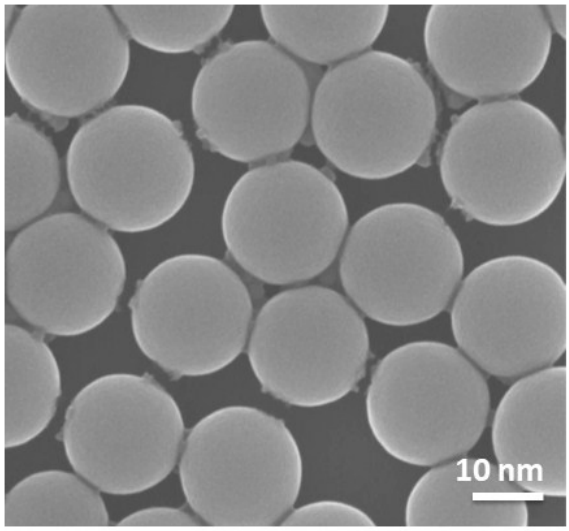

Fig. S4. SEM images of the employed silica. The length of scale bar is 10 nm

5. HR-TEM image of Fe particles

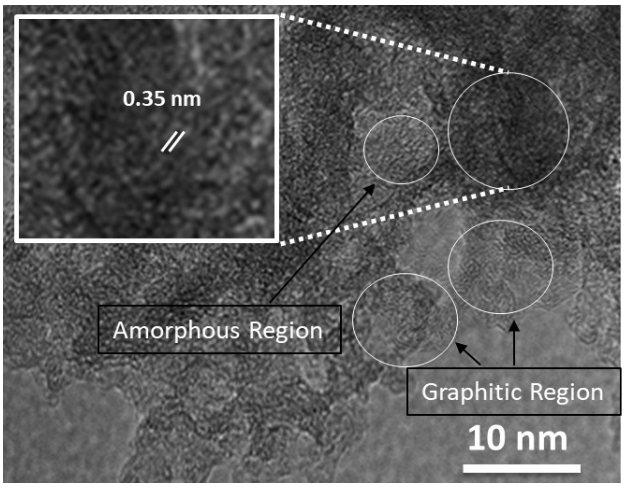

Figure S5. HR-TEM image of Fe particles

6. TGA Analysis

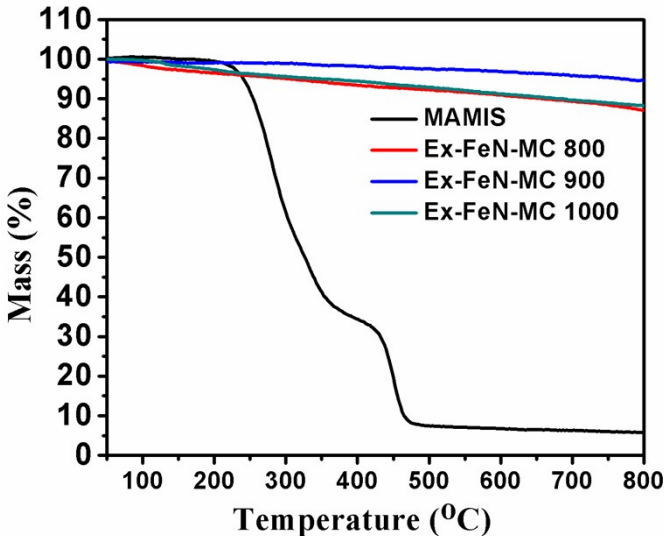

Figure S6. TG spectra of Ex-FeN-MC at different temperatures

6. XPS analysis

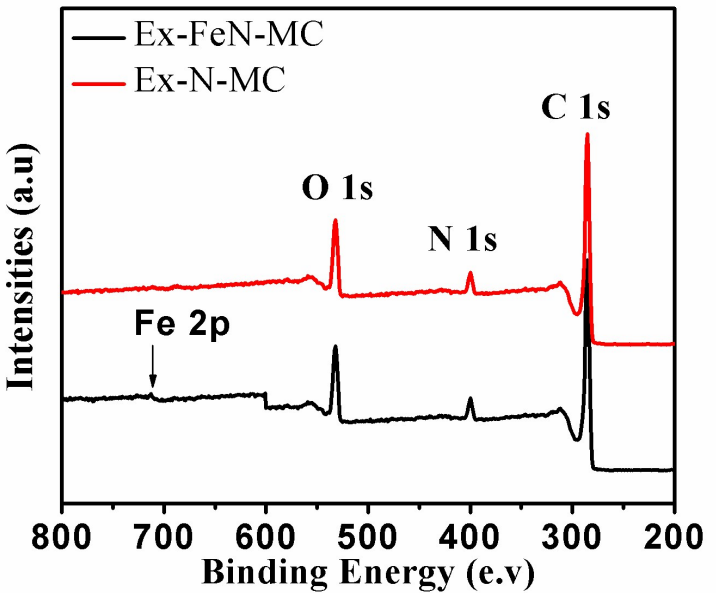

Figure S7. XPS spectra of Ex-N-MC and Ex-FeN-MC

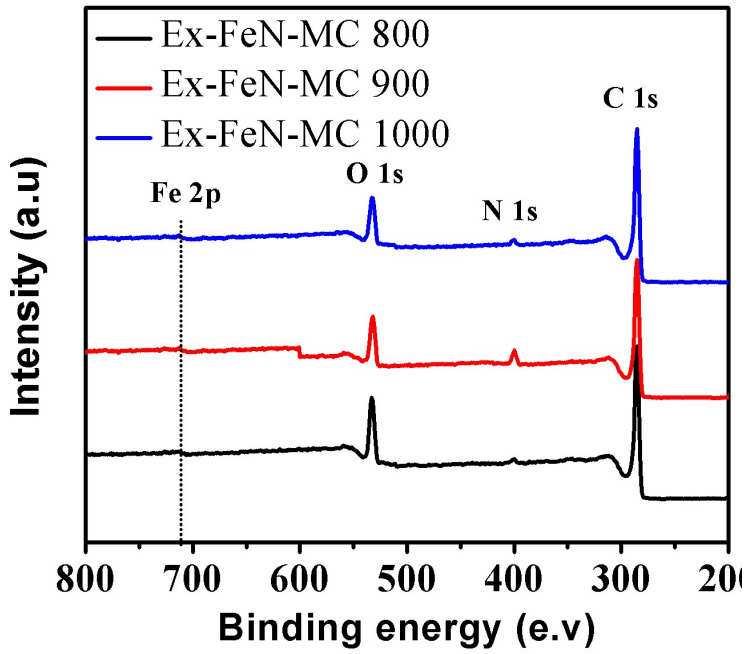

Figure S8. XPS spectra of Ex-FeN-MC at different temperatures of 800, 900, 1000 °C

7. CV curve of Ex-FeN-MC

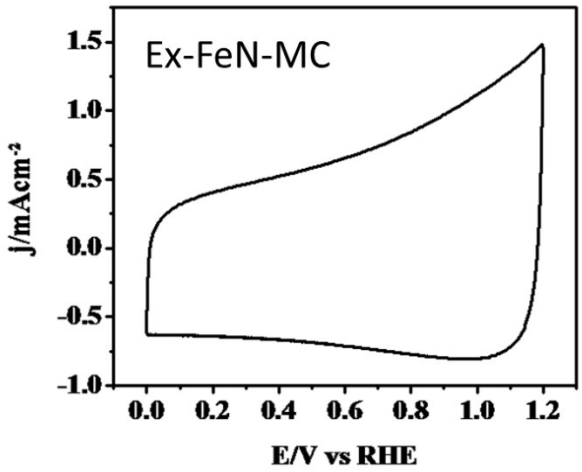

Figure S9. CV curve of Ex-FeN-MC

Table S1: Precious transition metals benchmark catalysts in alkaline media

Catalysts	Onset potential (V)	Half wave potential (V)	Electrolyte	Stability	Catalyst loading (mg cm^{-2})	References
Ex-FeN-MC catalyst (900 °C)	0.94	0. 84	0.1 M KOH	15000 cycles	0.2	This work
Fe-N-GC Catalyst (900 °C)	0.93	0.84	0.1M KOH	5000 cycles	0.2	30
Fe-N-MC Catalyst (900 °C)	0.94	0.83	0.1M KOH	------	0.4	25
FeNS/HPC (900 °C)	0.97	0.87	0.1M KOH	--------	0.2	31
FeNS/PC (900 °C)	0.93	0.83	0.1 M KOH	------	0.2	31
P-Fe-N-CNFs	Almost equal to or less than 0.9	Almost equal to 0.8	0.1 M KOH	------	---	33

Table S2. Elemental and species composition of Ex-FeN-MC

C [a] (%)	O [a] (%)	Fe [a] (%)	N [a] (%)	Si [a] (%)
83.46	11.69	0.75	3.69	0.4

[a] These atomic ratios are of elements obtained from XPS analysis.

Table S3. Elemental and species composition of Ex-FeN-MC at different temperatures.

T (°C)	C (%)	O (%)	Fe (%)	N (%)	Si (%)
800	78.43	14.28	0.24	1.84	2.3
900	81.46	13.69	0.75	3.69	0.4
1000	83.57	12.84	0.23	2.46	0.90