Electronic Supplementary Material (ESI) for RSC Advances.

The Structure and Magnetic Properties of Fe_3N as Photo-Catalyst Applied in Hydrogen Generation Induced by Visible Light

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Fe_3N and Fe_3C synthesized from triethylamine

Fe_3N and Fe_3C from a triethylamine route were synthesized according to a previous literature[1]. Briefly, 4.15mL triethylamine (TEA) was dissolved into 5.00 mL acetone, and then 0.81g anhydrous ferric chloride was added into the solution. Then the black solution was dried for 24h under the protection of nitrogen gas at room temperature. With continuous nitrogen flow, the as-synthesized precursor was calcinated to 560 and 600 ℃ for 30 min at the heating rate of 20 ℃/min, and then cooled down to collect the product.

Fe_3N and Fe_3C synthesized from aniline

0.81 g anhydrous ferric chloride was dissolved into 5 mL acetone under the vigorous stirring. Then 15 mL aniline was rapidly added rapidly into the solution above. Next, the black solution was dried for 48 h with the protection of nitrogen gas. Further with the continuous nitrogen flow, the precursor was calcinated to 560 and 660 ℃ for 30 min at the heating ramp of 20 ℃/min, respectively.

Fe_3N and Fe_3C synthesized from dicyandiamide

0.61g dicyandiamide was dispersed into 10 mL acetone at 30 ℃. Then 0.81 g anhydrous ferric chloride was added into the solution above under the vigorous stirring. Next, the red solution was dried for 48 h under the protection of nitrogen gas. Then with the continuous nitrogen flow, the precursor was calcinated to 560 and 680 ℃ for 30 min at the rate of 20 ℃/min, respectively.

Fe_3C synthesized from melamine

Fe_3N and Fe_3C from a triethylamine route were synthesized according to a previous literature[2]. Briefly, 2.70 g ferric chloride hexahydrate, 2.52g melamine and 2.91 g hexadecyl trimethyl ammonium bromide were dissolved into a mixed solution with 20 mL distilled water and 20 mL ethanol. The solution above should be dried at 80 ℃. The dried precursor was calcinated at 680 ℃ for 3 h with the heating rate of 20 ℃/min.

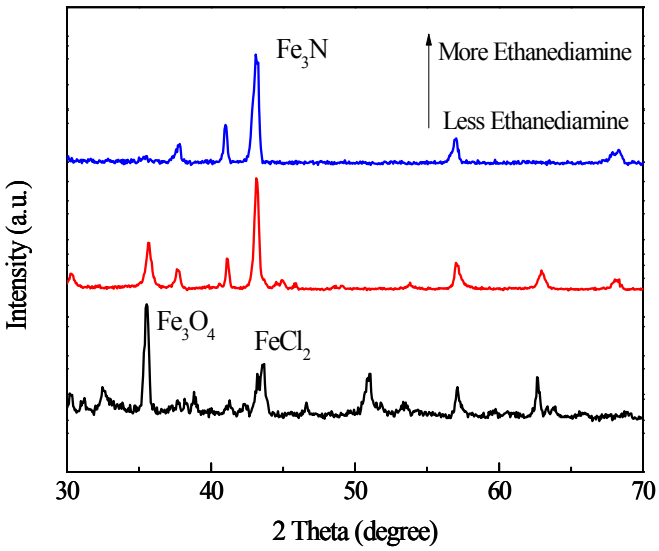

Figure S1 XRD patterns of calcinated product of the precursors prepared from different volumes of ethanediamine

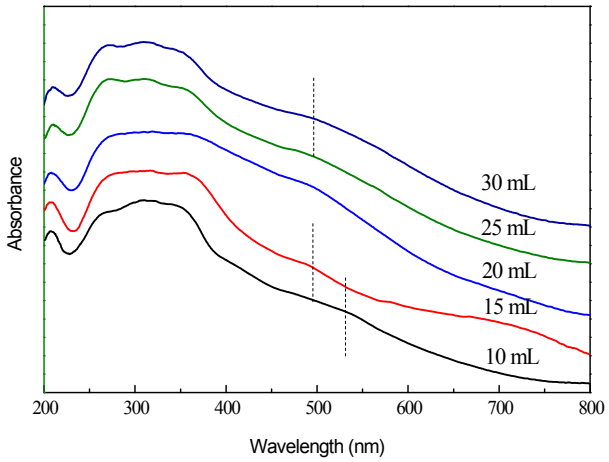

Figure S2 UV-vis absorption spectra of the precursors

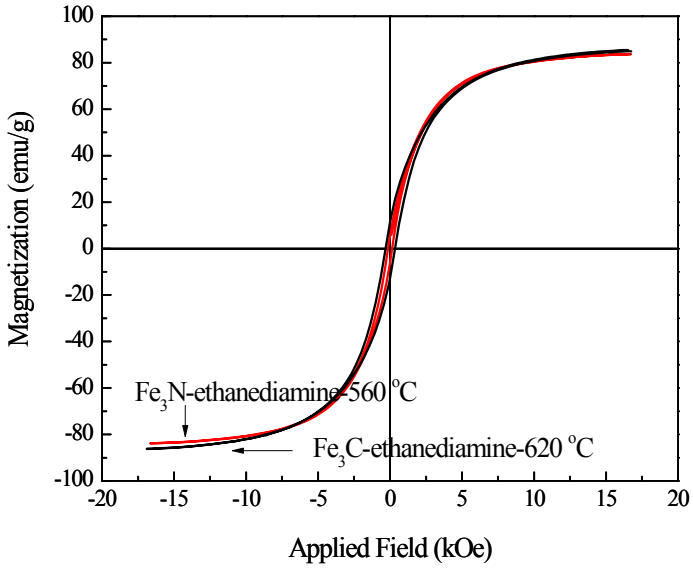

Figure S3 Hysteresis curves of calcinated product from the ethanediamine precursor

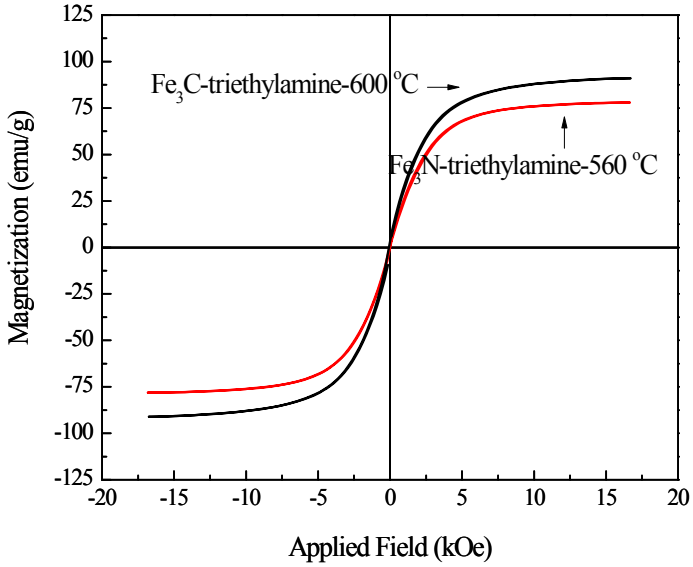

Figure S4 Hysteresis curves of calcinated product from the triethylamine precursor

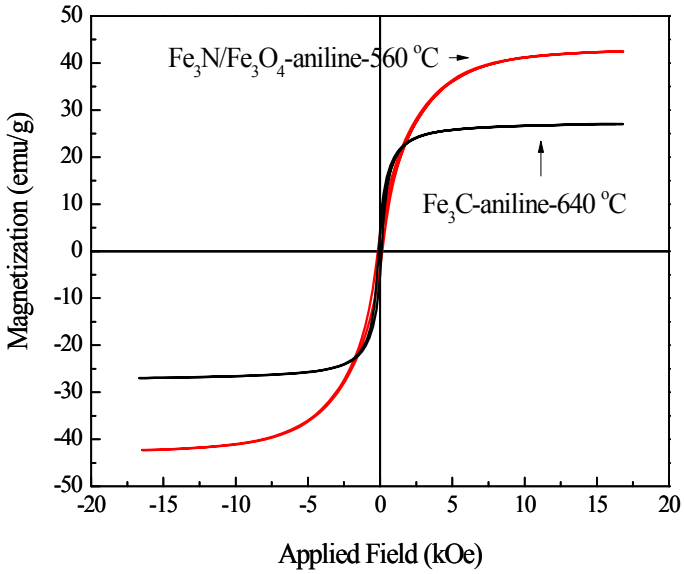

Figure S5 Hysteresis curves of calcinated product from the aniline precursor

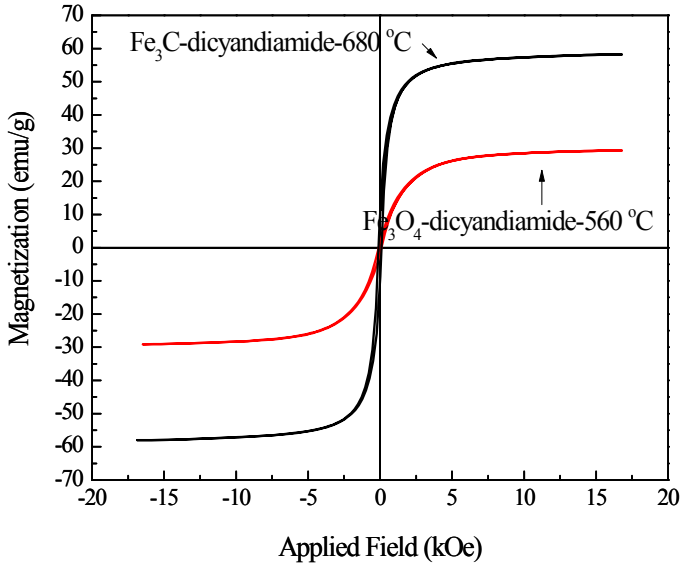

Figure S6 specific magnetization of calcinated product from dicyandiamide precursor

1. Zhang, P.; Wang, X.; Wang, W.; Lei, X.; Yang, H., Magnetic and hydrazine-decomposition catalytic properties of [varepsilon]-Fe3N synthesized from a novel precursor. *Journal of Materials Chemistry A* **2015,** *3* (12), 6464-6469.

2. Wang, X.; Zhang, P.; Gao, J.; Chen, X.; Yang, H., Facile synthesis and magnetic properties of Fe3C/C nanoparticles via a sol–gel process. *Dyes and Pigments* **2015,** *112* (0), 305-310.