Supporting Information

Catalytic epoxidation of stilbene over FePt@Cu nanowires (NWs) using molecular oxygen

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Synthesis of FePt@Cu *NWs:*

$Pt(acac)_2$ (200mg) and oleylamine (OAm) (20mL) were mixed at room temperature in argon atmosphere and heated to 120℃. The solution was kept at this temperature for 20min until the color turned to brown. $Fe(CO)_5$ (150μL) was injected into the hot solution and then raised to 160 ℃ for half an hour without stirring, the color turned to black. Then the temperature was decreased to 100℃, the mixture of $Cu(acac)_2$ (50mg) in OAm (10mL) was added under stirring and the temperature was raised to 180℃. After 30min, the solution was cooled down to room temperature. The black sediment was separated by adding ethanol (50mL) and hexane (10mL), and centrifugation (6000rmp, 10min). The NWs were washed three times by ethanol (50mL) and hexane (10mL) and dispersed in hexane.

General procedure for Catalytic epoxidation of stilbene over FePt@Cu NWs:

Catalyst testing was carried out in a sealed tube. 100μL FePt@Cu NWs (0.9mg) in hexane and 0.2 mmol *trans*-stilbene were added. The reaction tube was sealed and thrice evacuated and flushed with oxygen. The reactions were took place at a certain temperature under oxygen atmosphere. Resulting product mixtures were analysed by GC-MS (VARIAN 450-GC & VARIAN 240-GC) equipped with a CP8944 capillary column (30 m × 0.25 mm) and a FID detector. Catalyst testing was carried out in a sealed glass reactor fitted with an oxygen bag. All catalytic tests were repeated three times.

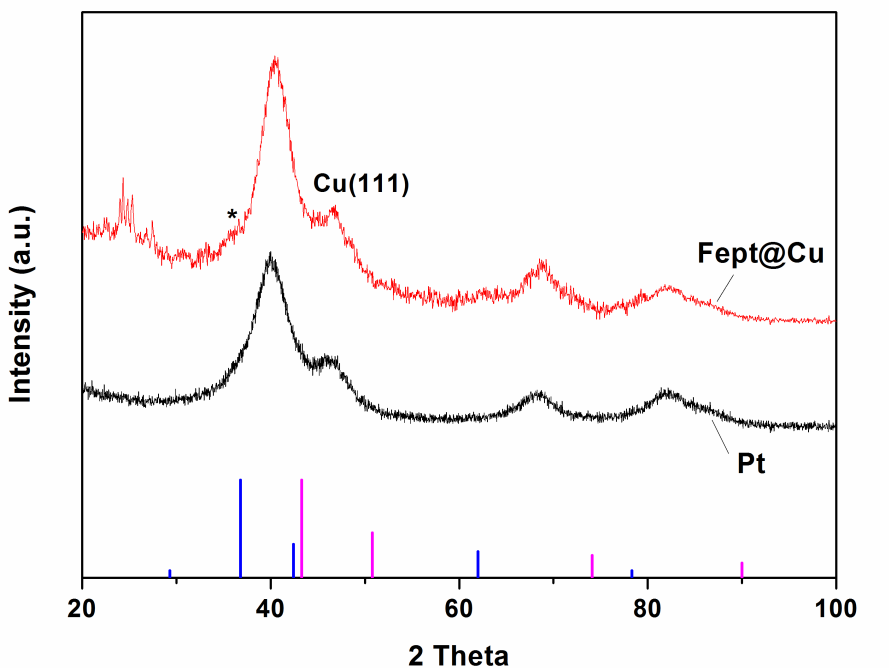


Fig. S1. X-ray diffraction (XRD) patterns of the FePt@Cu (red) and FePt (black) nanowires. Standard powder patterns for Cu (purple), and CuO (blue).

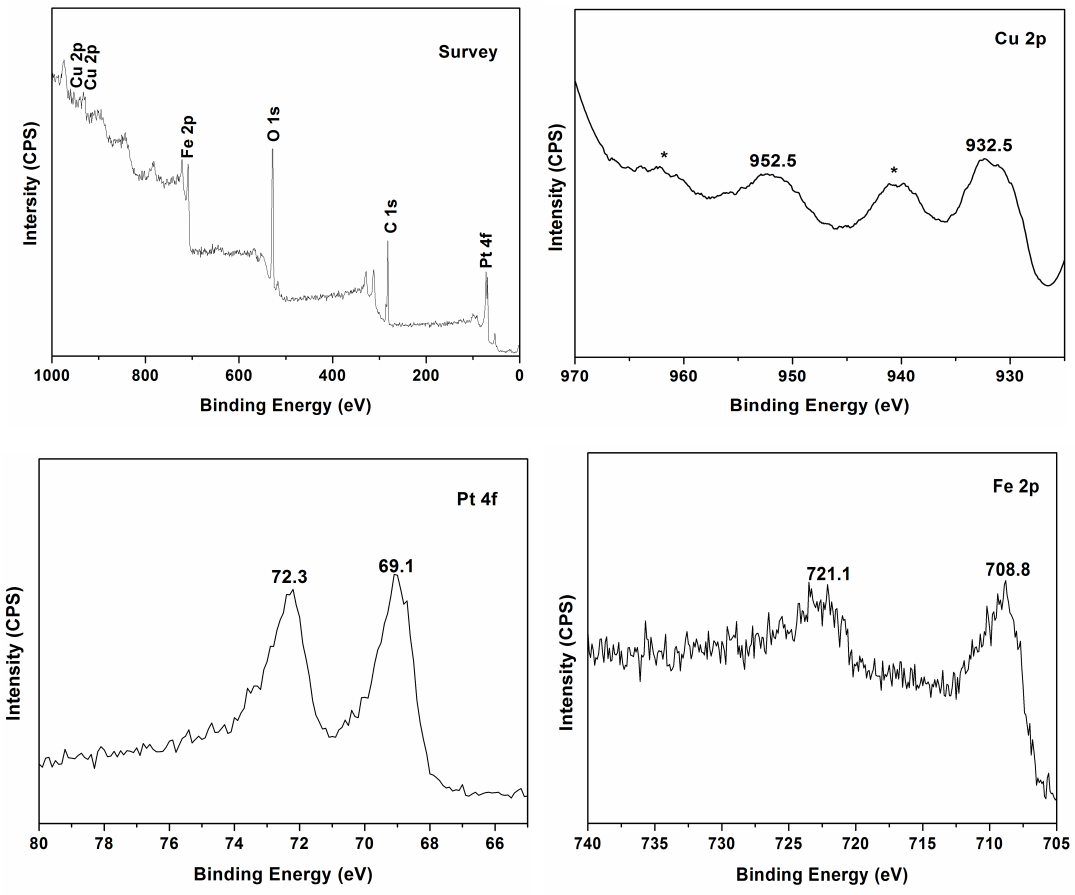


Fig. S2. X-Ray photoelectron spectra of FePt@Cu nanowires (a) survey; (b) Cu 2p peak; (c) Pt 4f peak and (d) Fe 2p peak. * denotes the satellite peaks.

Oxidation state of as-prepared FePt@Cu nanowires: XPS

The oxidation states of Cu in the as-prepared FePt@Cu nanowires were examined by Xray photoelectron spectroscopy (XPS) and the obtained results are shown in Fig. S2. The survey XPS spectra of NWs reveals the presence of copper (2p), Iron (2p), platinum (4f) oxide (1s) and carbon whose C 1s peak position (285.0 eV) was used to calibrate the acquired spectra. In the Cu 2p core level XPS spectra, the peaks corresponding to the Cu $2p_{3/2}$ and Cu $2p_{1/2}$ are observed at around 932.5 and 952.5 eV, which match well with the literature values for Cu^0 ($2p_{5/2}$ BE 932.6 eV, $2p_{1/2}$ BE 952.2 eV). Moreover, the Cu 2p core level spectrum displays several satellite peaks, which are characteristic of CuO having a d^9 configuration in ground state. Evidence of Cu (II) in the XPS spectra of as-prepared nanowires suggested the existence of a thin layer of CuO, which can be attributed to the presence of oxygen species on the nanowire surface. The XPS core level spectra for the Pt 4f shows values of 69.1 and 72.3 eV, respectively. In the Fe 2p core level XPS spectra, the peaks corresponding to the Fe $2p_{3/2}$ and Fe $2p_{1/2}$ are observed at around 708.8 and 721.1 eV. Both peaks match well with the previous result of XPS spectra of FePt [1]. These results suggest that asprepared nanowires consist primarily of metallic Cu and FePt. Copper on the surface of the FePt nanowires oxidizes due to exposure to air.

[1] D. Y. Wang, C. H. Chen, H. C. Yen, Y. L. Lin, P. Y. Huang, B. J. Hwang and C. C. Chen, *J. Am. Chem. Soc.*, 2007, **129**, 1538.

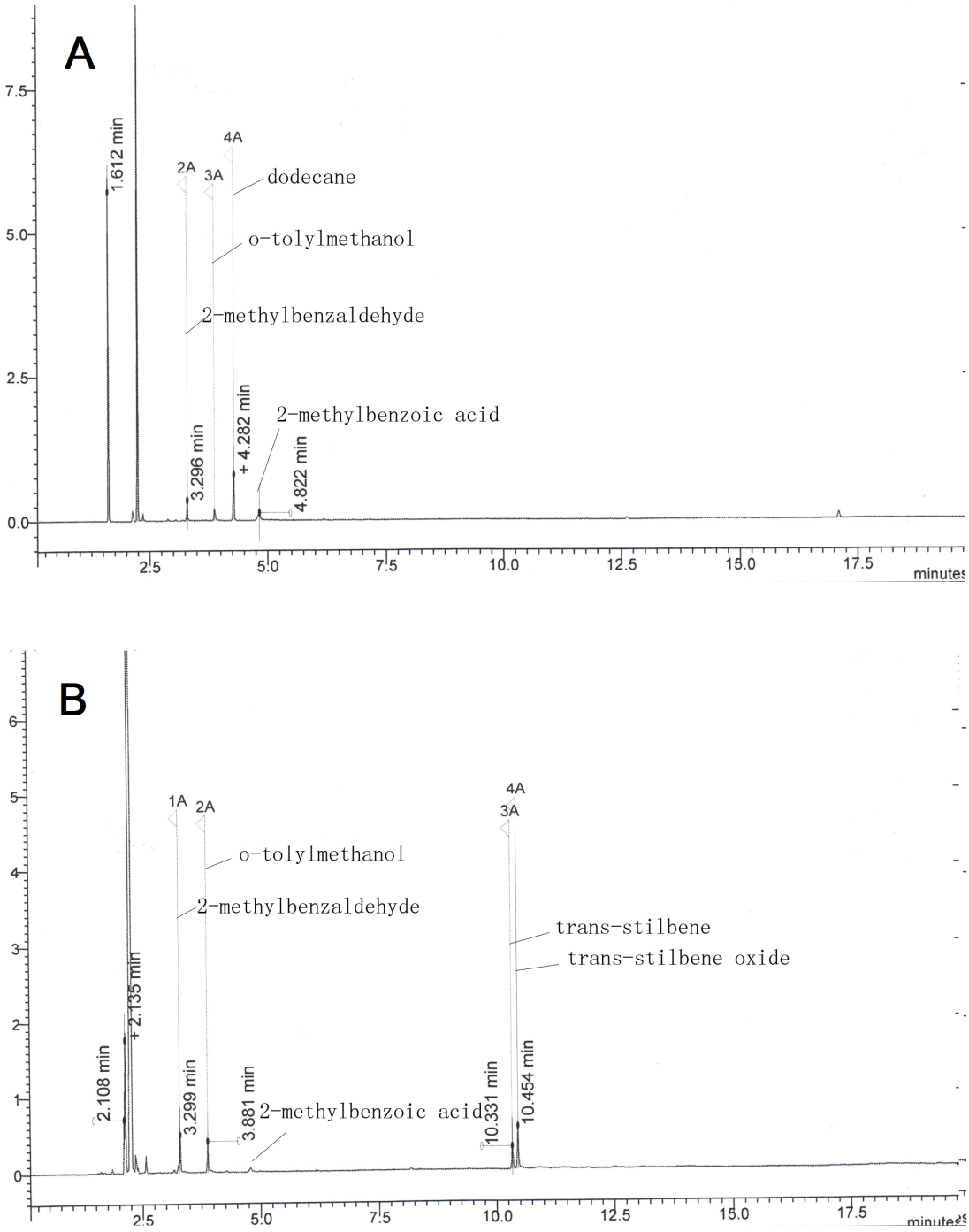
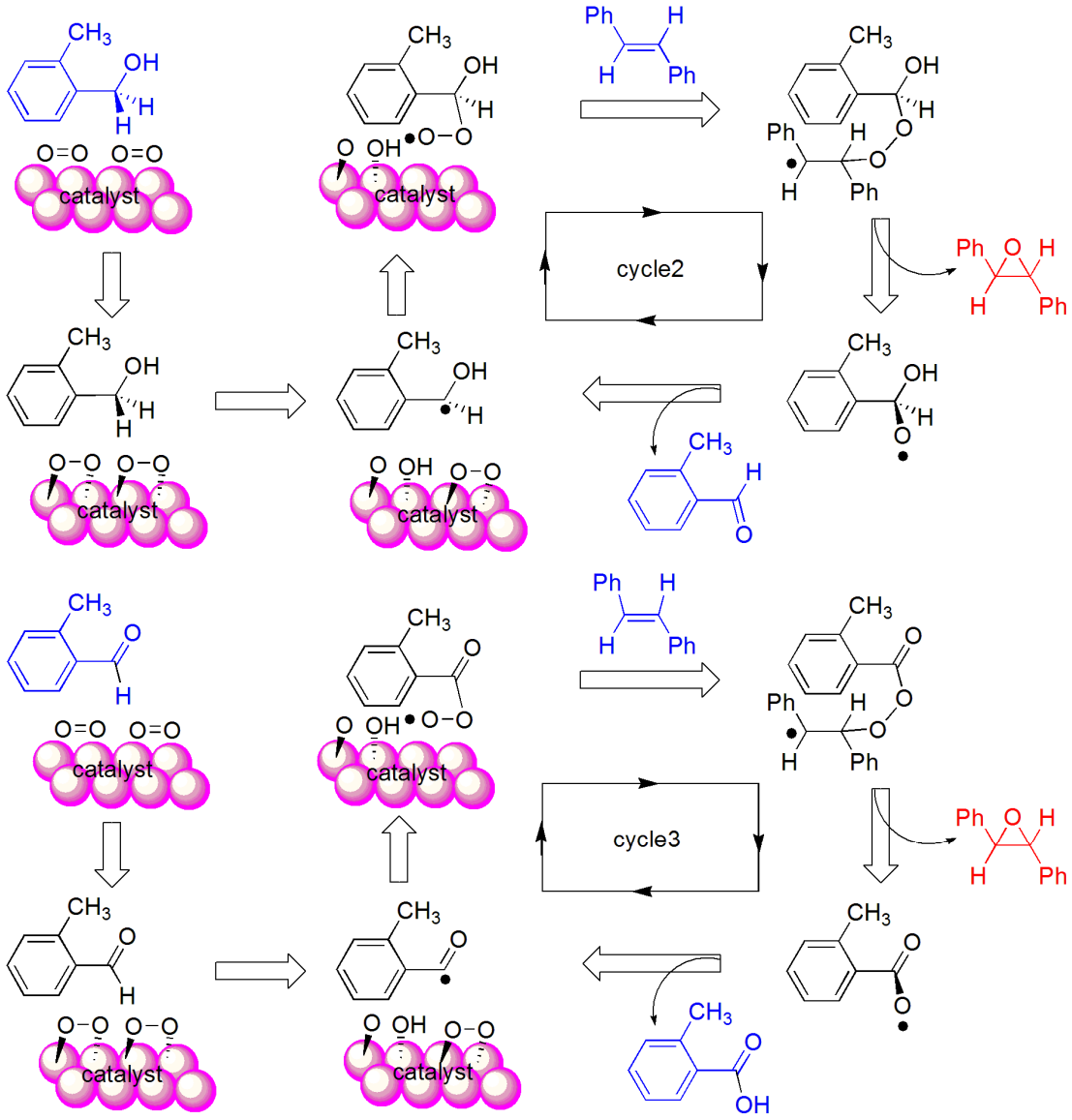
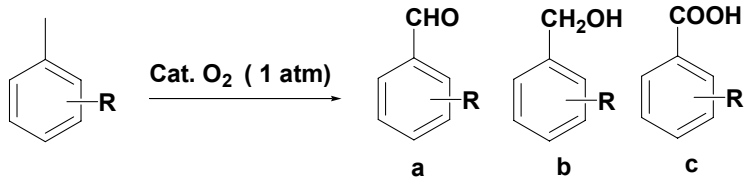


Fig. S3. GC analysis of the oxidation of *o*-xylene (A) and *trans*-stilbene (B).



Scheme. S1. The Proposed mechanism of cycle 2 and cycle 3.

Table S1. Oxidation of solvents on the surface of FePt@Cu NWs[a]



entry	Reactant	Converation (%)[b]	Selectivity (%) (a/b/c)[b]
1	H	trace	-
2	*o*-CH_3	2.0	33.4:28.7:.37.9
3	*m*-CH_3	trace	-
4	*p*-CH_3	0.9	61.3:21.1:17.6

[a] All reaction were carried out in the pressence of 0.9 mg FePt@Cu NWs and 2 mL reactant at 100 ^{0}C for 24 h under oxygen atmospheric (1atm). [b] GC yield.

Table S2. Oxidation of *o*-xylene on the surface of FePt@Cu NWs at differrent temperature

entry	T (^{o}C)	Converation (%)[b]	Selectivity (%) (a/b/c)[b]
1	60	trace	-
2	80	0.8	71.2:20.6:8.2
3	100	2.0	33.4:28.7:37.9
4	120	3.5	32.5:27.1:40.4

[a] All reaction were carried out in the pressence of 0.9 mg FePt@Cu NWs and 2 mL *o*-xylene for 24 h under oxygen atmospheric (1atm). [b] GC yield.

Table S3. Recovery and Reuse of FePt@Cu NWs as Catalyst for expoxidation of *trans*-stilbene at 100^{o}C of 24 h[a]

use	1st	2nd	3rd	4th
Conv.(%)[b]	87.0	85.6	85.2	84.5
Select.(%)[b]	97.8	97.3	96.9	93.2
Yeild (%)	85.1	83.3	82.6	78.8

[a] 0.9 mg FePt@Cu NWs , 0.2 mmol *tran*-stilbene, and 2 mL *o*-xylene at 100 ^{0}C for 24 h under oxygen atmospheric (1atm). [b] GC yield

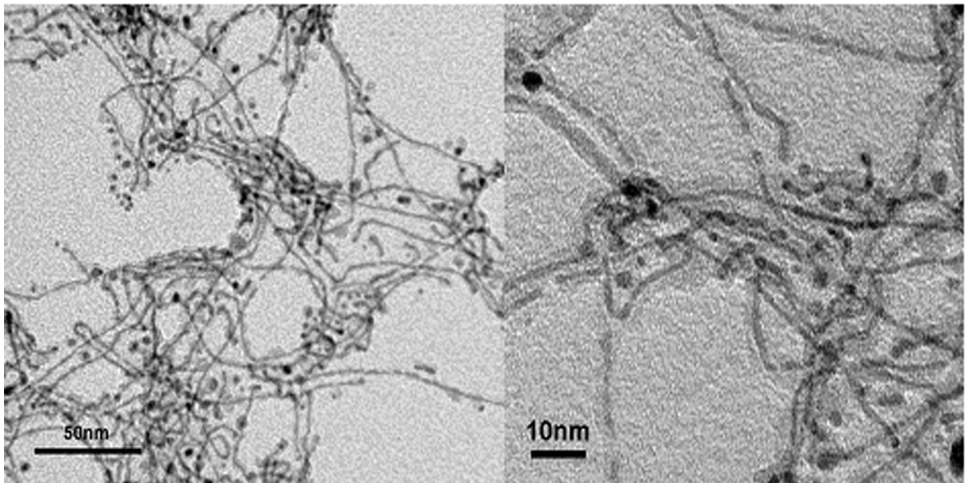


Fig. S4. TEM images of FePt@Cu NWs after reaction.

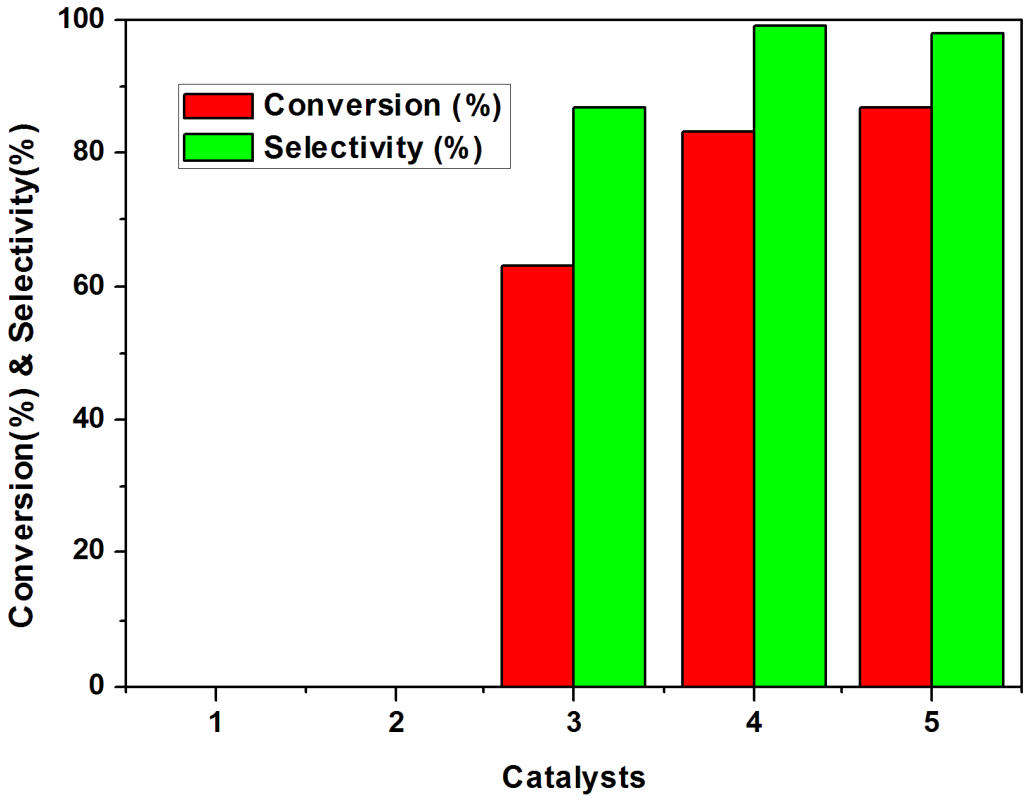


Fig. S5. Compared the oxidation activity of FePt@Cu NWs with other catalysts. 1. FePt NWs; 2. Pt NWs; 3. Cu NPs; 4. PtCu NWs; 5. FePt@Cu NWs.