

## Electronic Supplementary Information

### **Fabrication and Catalytic Activity of FeNi@Ni Nanocables for the Reduction of *p*-nitrophenol**

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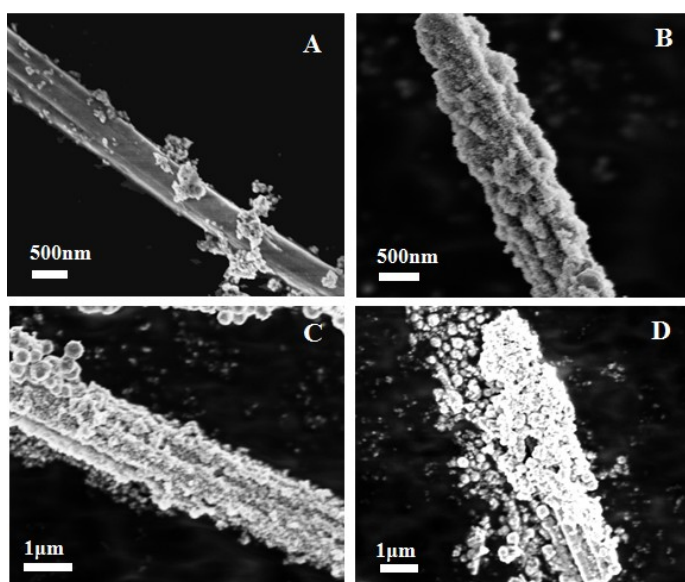
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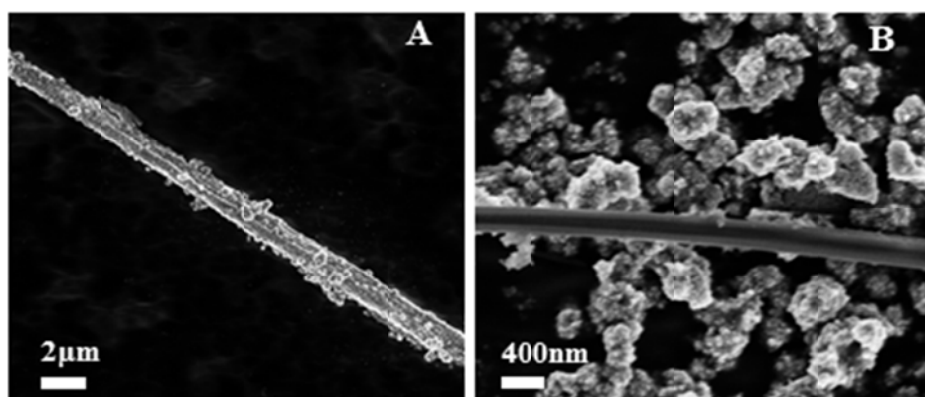
**Table 1.** Saturation magnetization ( $M_s$ ) , retentivity ( $M_r$ ) and coercivity ( $H_c$ ) of FeNi@Ni nanocables, FeNi NRs and Ni NPs.

Sample	$M_s$ (emu/g)	$H_c$ (Oe)	$M_r$ (emu/g)
Ni	101.27	204.22	33.00
FeNi	29.746	34.20	23.41
FeNi@Ni	156.82	48.42	11.86



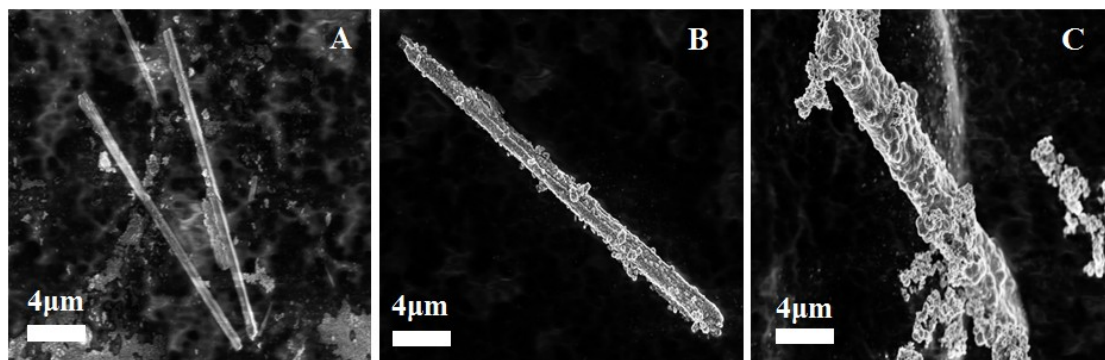
**Figure S1.** SEM images of a single FeNi@Ni nanocable obtained in different amount NiCl<sub>2</sub>•6H<sub>2</sub>O: (A)10 mM; (B) 20 mM; (C) 30 mM; (D) 40 mM.

Figure S1 shows that the concentration of Ni<sup>2+</sup> has a great influence on the formation of FeNi@Ni nanocables, a lack of Ni<sup>2+</sup> leads to the result that FeNi NRs can't be fully covered by Ni NPs, when Ni<sup>2+</sup> exceeds the optimum(20 mM), a good number of Ni NPs which are much bigger are generated on the FeNi@Ni nanocables. From this a conclusion can be reached that Ni NPs are generated and accumulated on the surface of FeNi NRs through the metallic bonding or magnetic effect as the reaction proceeding.



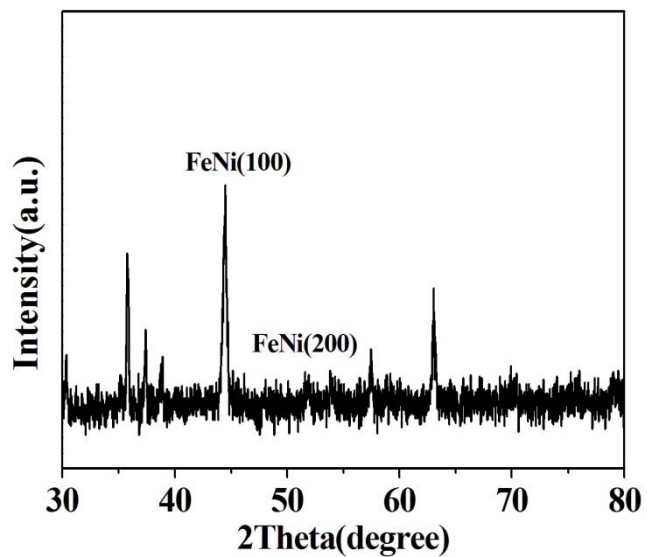
**Figure S2.** SEM images of a single FeNi@Ni nanocable obtained with the concentration of NaOH at 20 mM (A) and without NaOH (B).

Figure S2 illustrates the importance of NaOH in the formation of FeNi@Ni nanocables. If NaOH is absent, no Ni nanoparticles are deposited on the surface of FeNi@Ni nanocables (Figure S2A). When 40 mg NaOH were added in the reaction system, FeNi NRs could be well coated by Ni NPs.



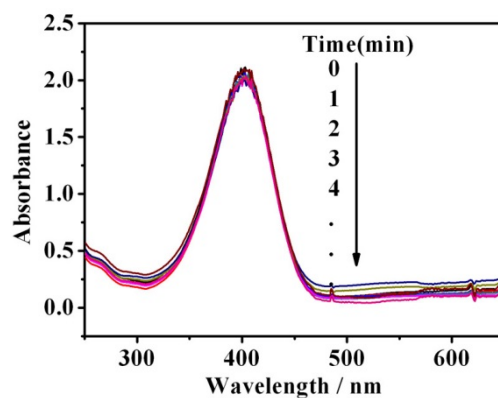
**Figure S3.** SEM image of a single FeNi@Ni nanocable prepared in different amount of PVP: (A) 0 mg; (B) 25 mg; (C) 45 mg.

That the role PVP plays in the formation of FeNi@Ni nanocables is shown in Figure S3. The amount of PVP is a primary factor which affects the coating effect. Without PVP involving in the reaction, FeNi NRs are separate from Ni nanoparticles, when PVP varies from 0 mg to 45 mg, the coating effect due to the space limitation can be significantly improved. The oriented density of Ni NPs could be controlled by varying the molar ratio between FeNi and Ni at the optimized concentration of NaOH and PVP.



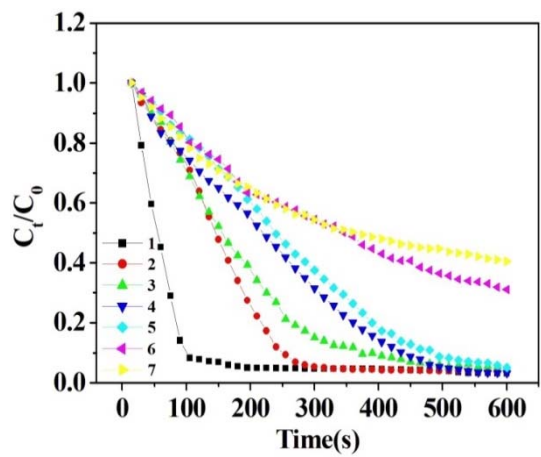
**Figure S4.** XRD pattern of FeNi NRs after annealing at 773 K under argon.

Figure S4 shows the XRD pattern of FeNi NRs after annealing at 773 K under argon. FeNi NRs transferred to a long-range chemically ordered fcc structure, two peaks at  $44.2^\circ$ ,  $51.5^\circ$  indicating the characteristic diffractions of FeNi nanoalloy



**Figure S5.** UV-vis spectra of reaction solution without catalysts.

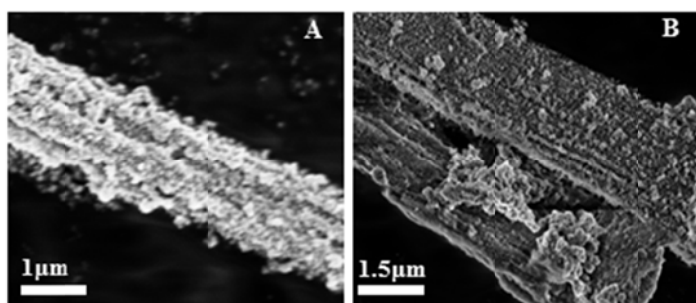
Figure S5 shows the UV-vis spectra of the hydrogenation reduction of PNP under ambient atmosphere at room temperature by employing excess  $\text{NaBH}_4$  without any catalysts in the reaction. The absorption peak at 400 nm represents for PNP, the peak intensity at 400 nm stays the same as time goes on, indicating that the reaction doesn't take place without catalyst involving in the reaction.



**Figure S6.** Catalytically recyclable hydrogenation reduction of *p*-nitrophenol to *p*-aminophenol by FeNi@Ni nanocables.

Figure S6 shows the  $C_t/C_0$  versus time  $t$  over the seven recycle, the reaction time prolonged as the the increase of reaction times. *p*-nitrophenol can be successfully reduced to *p*-aminophenol with stable conversion efficiency of almost 100% in the first 5 recycle within 10 minutes.





**Figure S7.** SEM images of FeNi@Ni nanocables after the hydrogenation reduction of PNP to PAP for two times (A) and seven times (B).

Figure S7 shows that FeNi@Ni nanocables basically maintained the original structure, indicating the structure stability of FeNi@Ni nanocables in 75% ethanol solution.