Supporting information

Core-shell $Co@SiO_2$ nanospheres immobilized Ag nanoparticles for hydrogen evolution from ammonia borane

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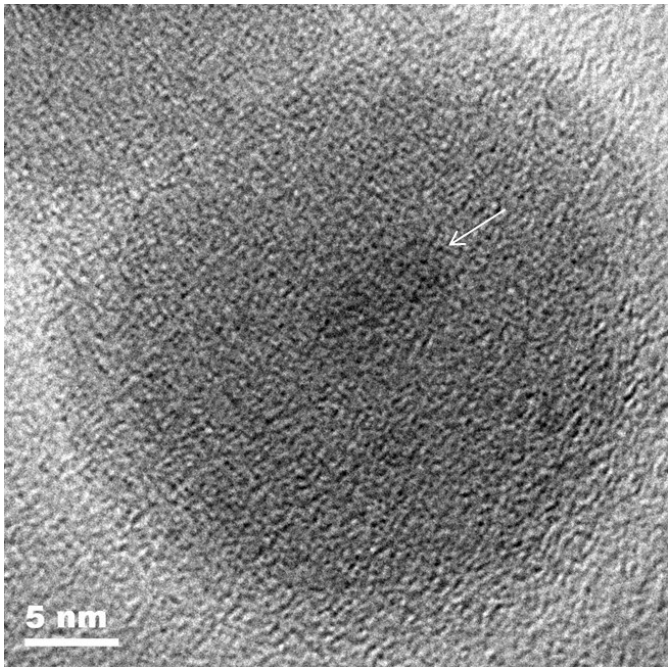

Fig. S1 TEM image of $Co@SiO_2$ nanospheres.

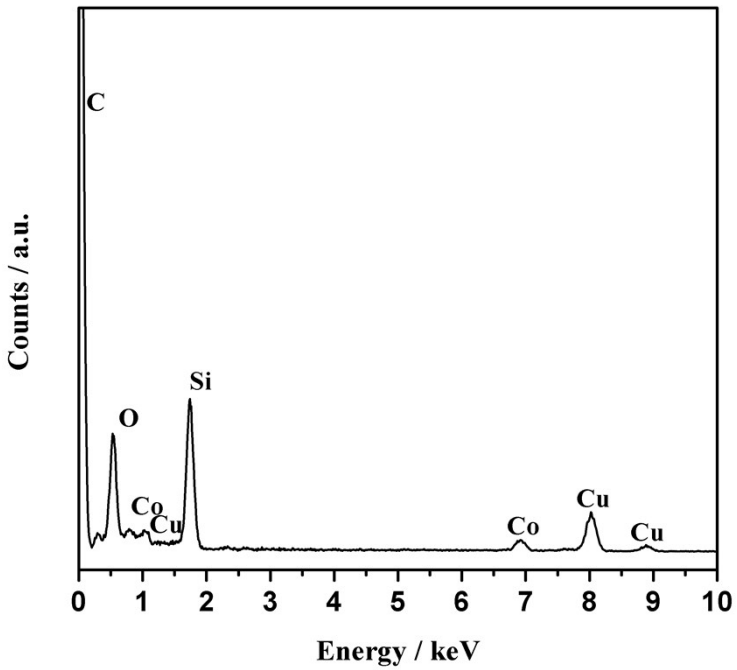

Fig. S2 The corresponding EDX spectrum for the Co@SiO_2 NPs.

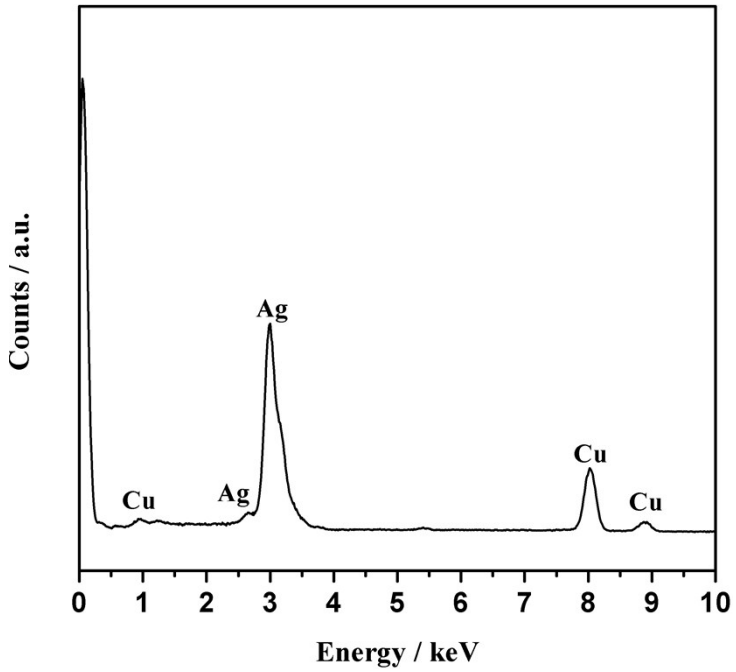

Fig. S3 The corresponding EDX spectrum for the Ag NPs.

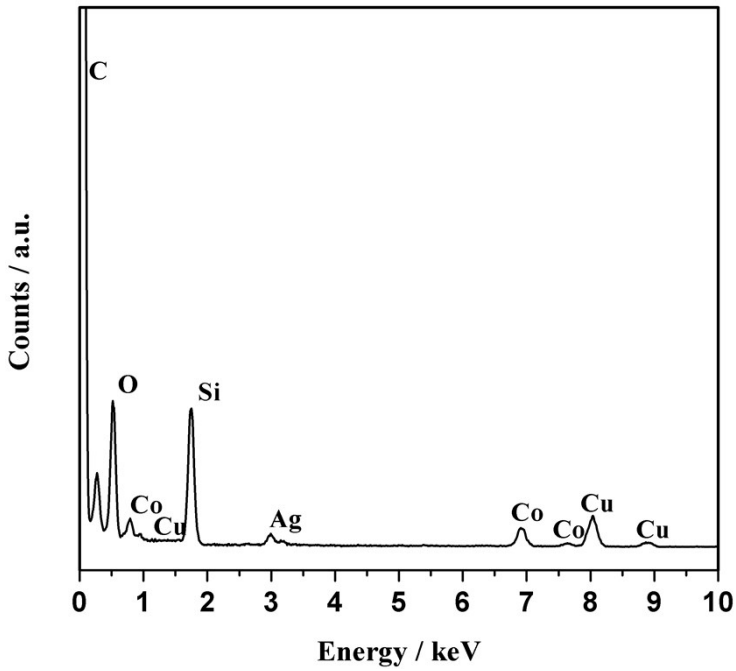

Fig. S4 The corresponding EDX spectrum for the Co@SiO_2/Ag NCs.

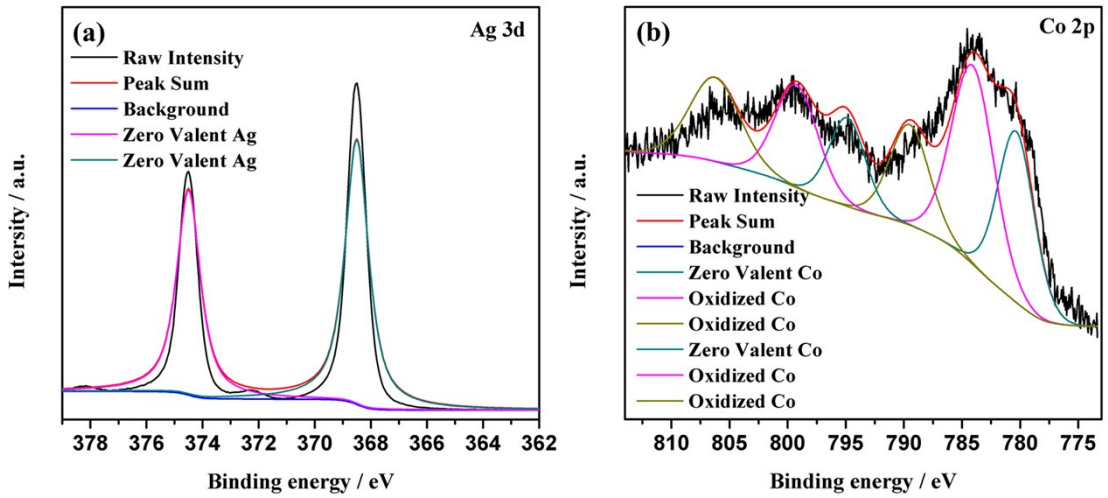

Fig. S5 XPS spectra of (a) Ag 3d for the free Ag and (b) Co 2p for the Co@SiO_2.

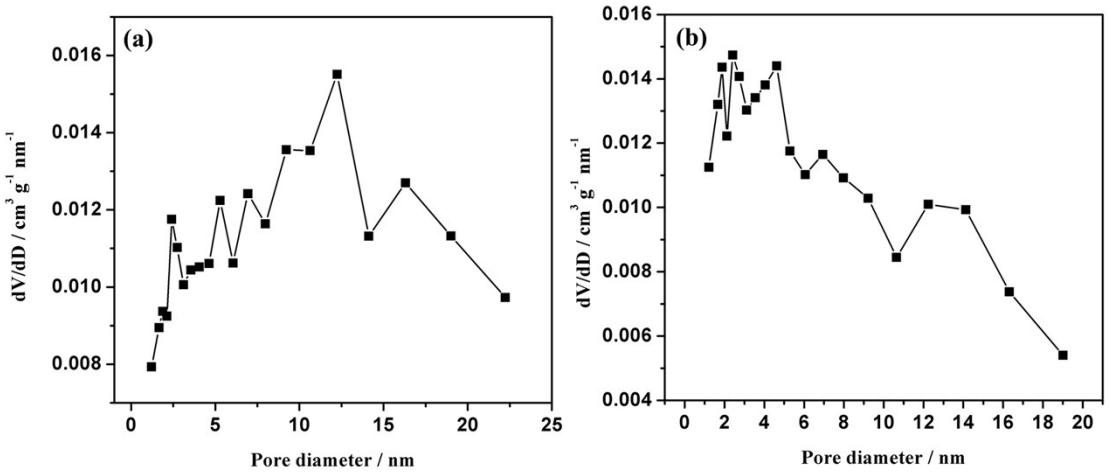

Fig. S6 The pore size distribution of (a) Co@SiO_2 and (b) Co@SiO_2/Ag nanospheres.

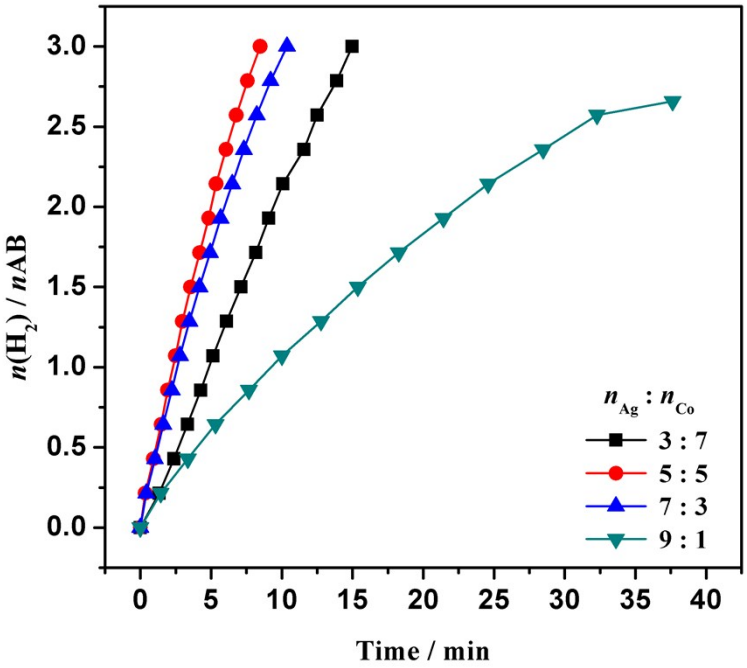

Fig. S7 Hydrogen generation from the hydrolysis of AB (0.2 M, 5 mL) catalyzed by Co@SiO_2/Ag NCs with different Ag and Co molar contents at 298 K (metal/AB = 0.02).

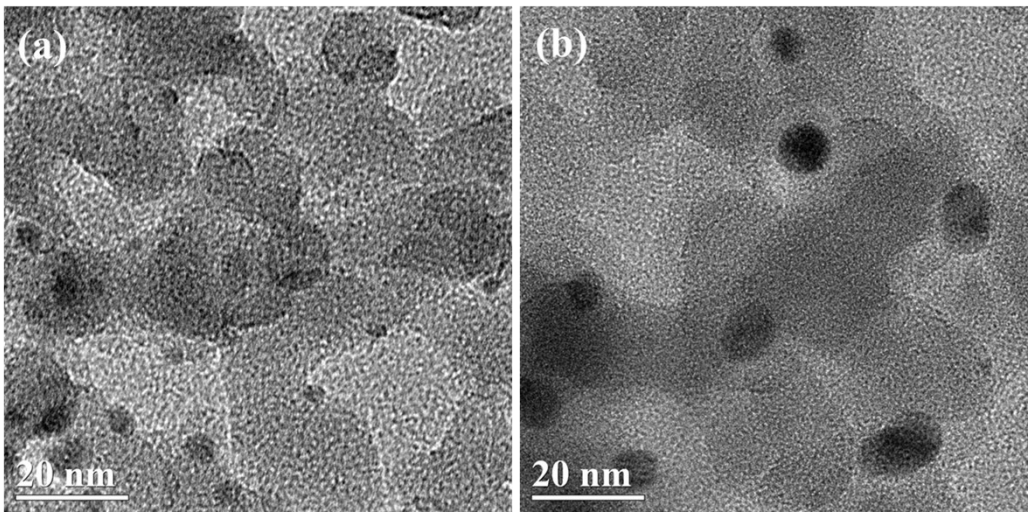

Fig. S8 TEM images of the (a) Ag/SiO_2-24 h NCs and (b) Ag/SiO_2-12 h NCs.

The commercial SiO_2 supported Ag NPs were prepared via in situ synthesis method. Briefly, 3.41 mg $AgNO_3$ and 50 mg commercial SiO_2 (Degussa, 200 m^2 g^{-1}) were dissolved in 5 mL of distilled water. After the mixtures were vigorous stirred at room temperature for 12 h (labeled as Ag/SiO_2-12 h) or 24 h (labeled as Ag/SiO_2-24 h), 34.3 mg of AB (nAg/nAB = 0.02) was added into the solution with stirring. The size and morphology of the above two samples were characterized by TEM. As shown in Fig. S8, the size of Ag NPs in Ag/SiO_2-24 h is much smaller than that of Ag/SiO_2-12 h. The catalytic activities of Ag catalysts for the hydrolysis of AB were increased with the decreasing the size of Ag NPs (Fig. S9). The catalytic activities are in the order of Ag/SiO_2-24 h > Ag/SiO_2-12 h > free Ag (Fig. S9). Yet, the hydrolysis of AB was still not complete by the monometallic Ag catalyst with smaller Ag NPs size (Ag/SiO_2-24 h).

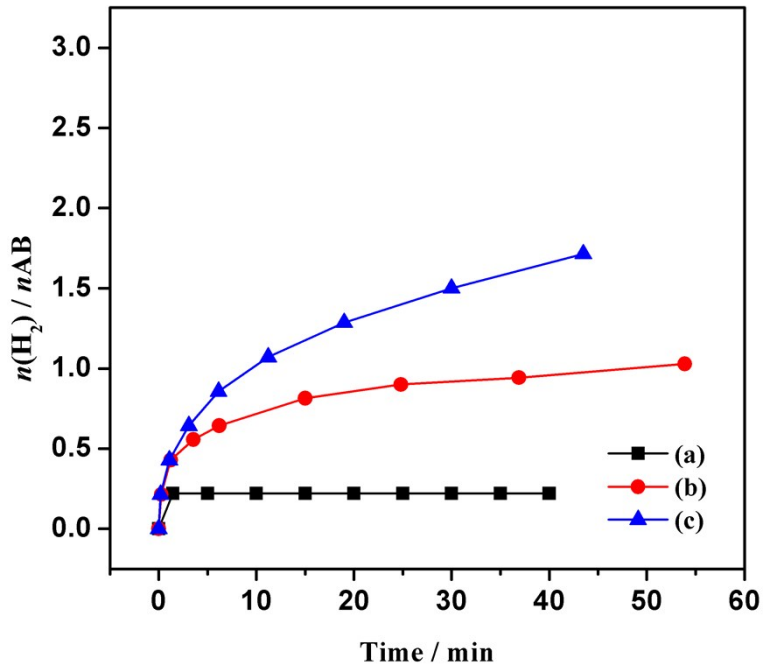

Fig. S9 Hydrogen generation from the hydrolysis of AB (0.2 M, 5 mL) catalyzed by (a) free Ag, (b) Ag/SiO_2-12 h, and (c) Ag/SiO_2-24 h at 298 K (metal/AB = 0.02).

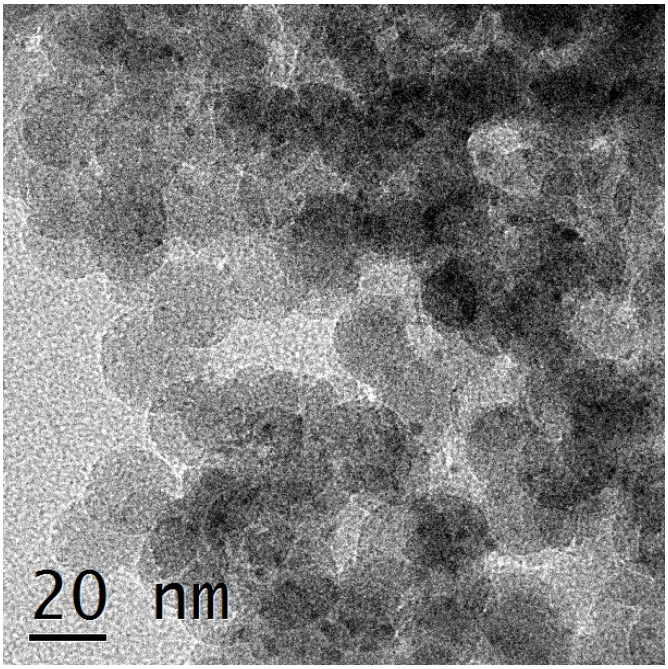

Fig. S10 TEM image of the recycled Co@SiO_2/Ag NCs.