

Supporting information (SI)

A new facile strategy for higher loading of silver nanoparticles onto silica for efficient catalytic reduction of 4-nitrophenol

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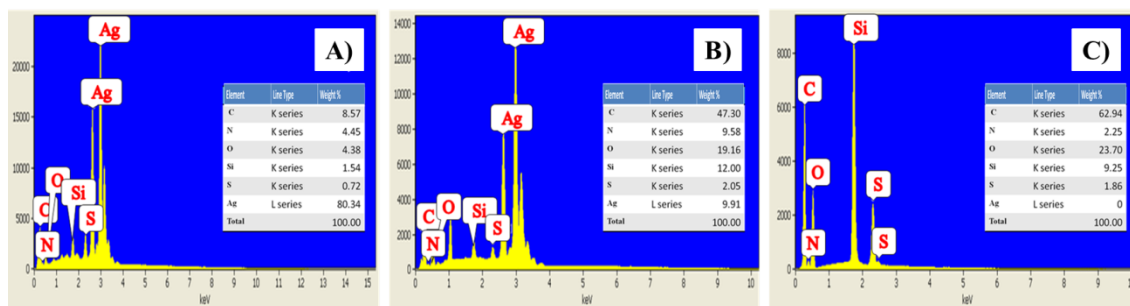


Fig. S1. EDAX spectrum of **A)** Ag(seed)-SiO₂(p-TSA⁻); **B)** Ag(E)-SiO₂ and **C)** Pristine SiO₂.

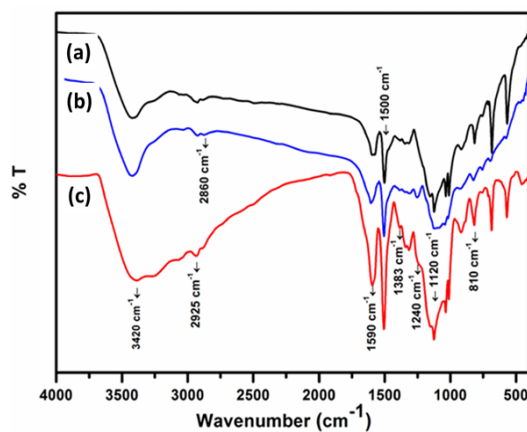


Fig. S2. FTIR spectrum of (a) Ag(E)-SiO₂, (b) Ag(seed)-SiO₂(p-TSA⁻) and (c) pristine SiO₂.

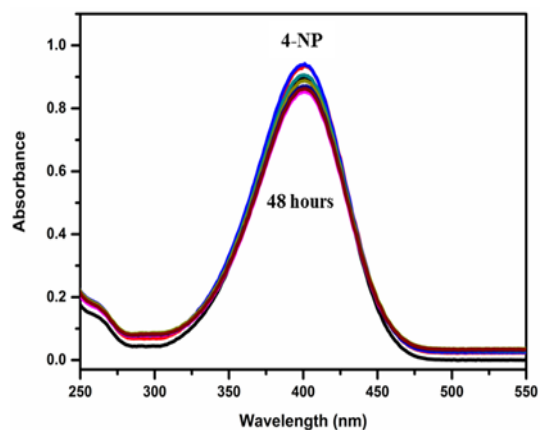


Fig. S3. UV-vis spectra recorded during the reduction of 4-NP in the presence of pristine SiO₂ catalyst; Amount of catalyst = 0.25 g/L, [NaBH₄] = 50 mM and [4-NP] = 0.5 mM

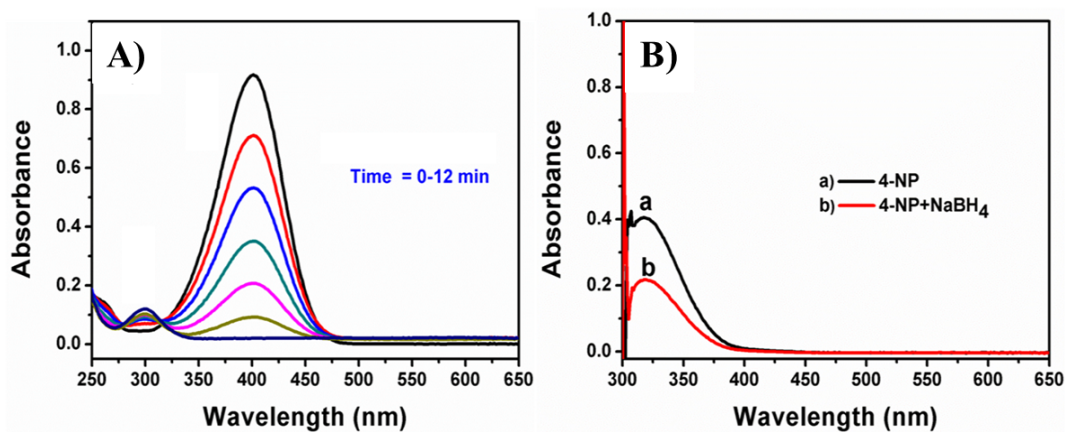


Fig. S4. Successive UV-vis spectra recorded during the reduction of 4-NP with different pH **A)** pH=10 and **B)** pH=5 in presence of Ag(seed)-SiO₂(p-TSA⁻) catalyst; Amount of catalyst = 0.25 g/L and [4-NP]= 0.5 mM.

SI: Table. T1 Experimental conditions for 4-nitrophenol reduction

Concentration of 4-Nitrophenol (mM)	Amount of Catalyst* (g/L)	pH medium	Temperature (Kelvin)
0.50	0.25	7	298
0.75	0.25	7	298
1.00	0.25	7	298
1.25	0.25	7	298
0.50	0.00	7	298
0.50	0.05	7	298
0.50	0.10	7	298
0.50	0.15	7	298
0.50	0.25	5	298
0.50	0.25	10	298
0.50	0.25	7	313
0.50	0.25	7	333

*Catalyst = Ag (E)-SiO₂ or Ag(seed)-SiO₂(p-TSA⁻) or pristine SiO₂

SI: Table. T2 The comparison of Ag NPs sizes

Catalyst	Ag NP size (nm)	References
Fe ₃ O ₄ @SiO ₂ -Ag MNPs	10	1
Fe ₃ O ₄ /SiO ₂ @Ag	30	2
micron-SiO ₂ @nano-Ag particles	10-60	3
Ag ₅ @SBA-15	~7	4
Cu/Ag bimetallic nanoparticles	14.3±2.2	5
SiO ₂ supported-Ag NPs	Wide ranges 2 to 51nm	6

References

1. D. Xiaoyan, H. Jiang, Z. Jie, S. Lijuan and A. Songsong, *Appl. Surf. Sci.*, 2012, **258**, 2717– 2723
2. K. S. Shina, Y. K. Choa, J. Y. Choib and K. Kim, *Appl. Catal. A: Gen.*, 2012, **413– 414**, 170– 175.
3. W. Man, T. Di, T. Panpan and Y. Liangjie, *Appl. Surf. Sci.*, 2013, **283**, 389– 395.
4. B. Naik, S. Hazra, V.S. Prasad and N. N Ghosh, *Catal. Commun.*, 2011, **12**, 1104–1108.
5. W. Wu, M. Lei, S. Yang, L. Zhou, L. Liu, X. Xiao, C. Jiang and V. A. L. Roy, *J. Mater. Chem. A*, 2015, **3**, 3450-3455.
6. V. Raji, M. Chakraborty, and P. A. Parikh, *Ind. Eng. Chem. Res.*, 2012, **51**, 5691–5698.