

Supporting information

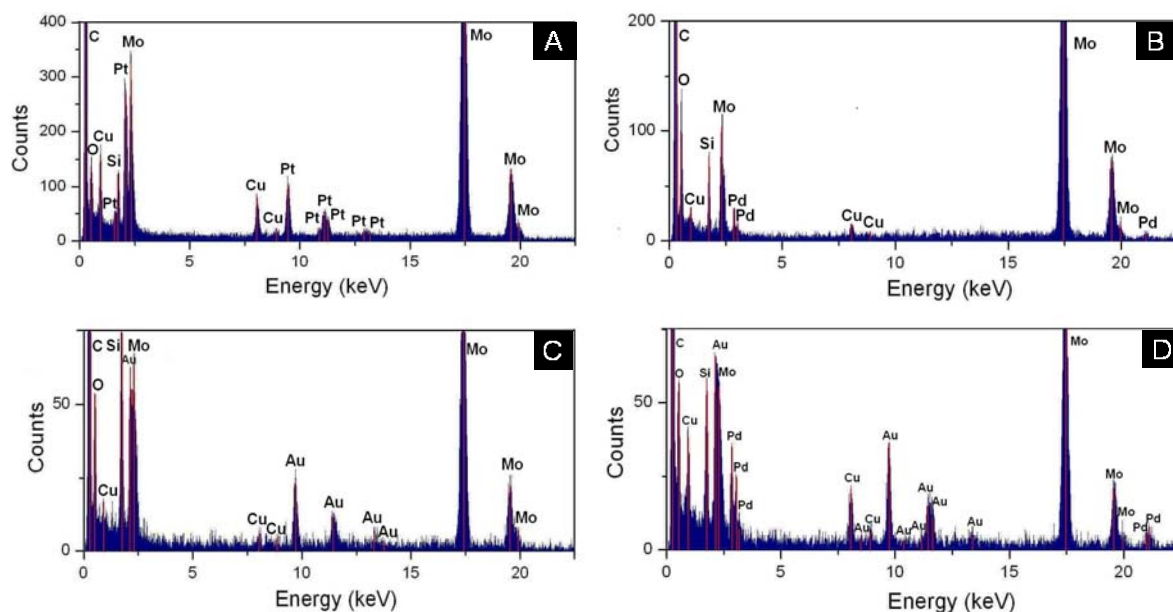


Figure S1 EDS spectra of (a) Cu-Pt BNMNs, (b) Cu-Pd BNMNs, (c) Cu-Au BNMNs, and (d) Cu-Au-Pd trimetallic nanocrystals. The signals of C, O, Si, and Mo are from the carbon coated Mo grid.

Table S1 ICP results of Cu- and Ag-based BNMNs			
Sample	Precursors	molar ratio	
		Cu:Pt	Cu:noble metal
Cu-Pt	Cu:Pt	1:0.44	Cu: noble metal=1:0.3
Cu-Pd	Cu:Pt	1:0.43	
Cu-Au	Cu:Au	1:0.41	
Cu-Au-Pd	Cu:Au:Pt	1:0.42:0.42	
Ag-Pt	Ag:Pt	1:0.31	Ag: noble metal=1:0.3
Ag-Pd	Ag:Pt	1:0.30	
Ag-Au	Ag:Au	1:0.32	

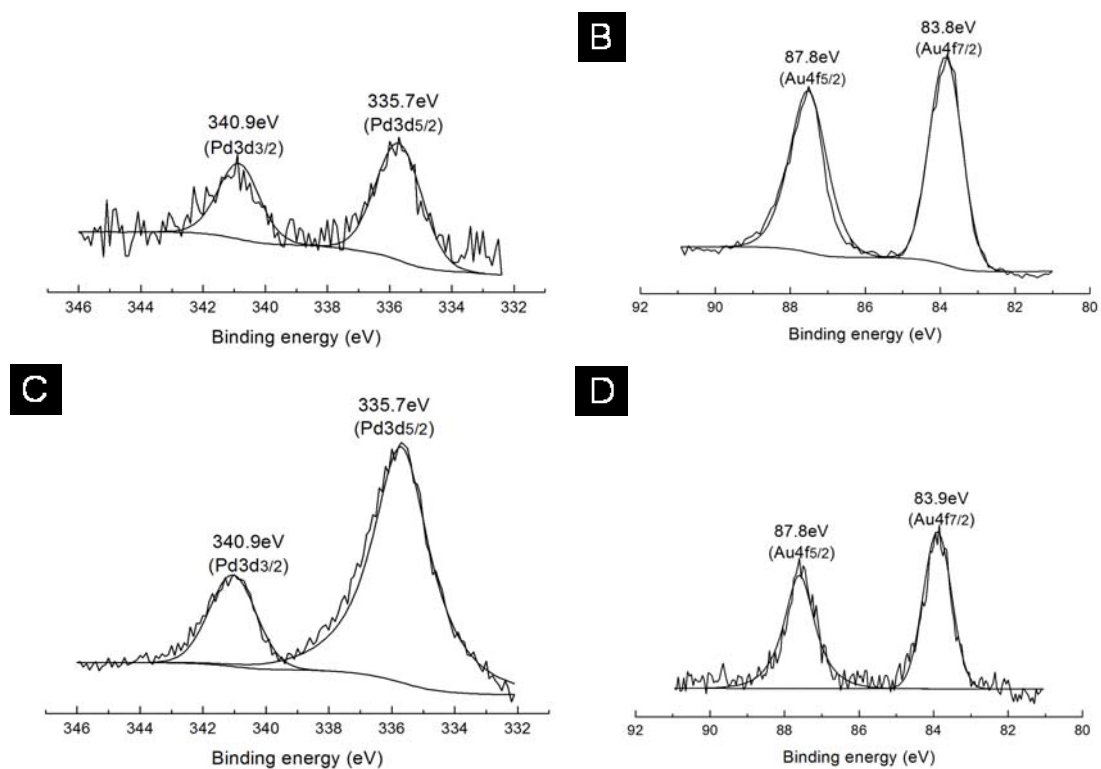


Figure S2 XPS spectra of Pd3d in Cu-Pd BNMNs (a), Au4f in Cu-Au BNMNs (b), Pd3d and Au4f in Cu-Au-Pd trimetallic nanocrystals(c, d).

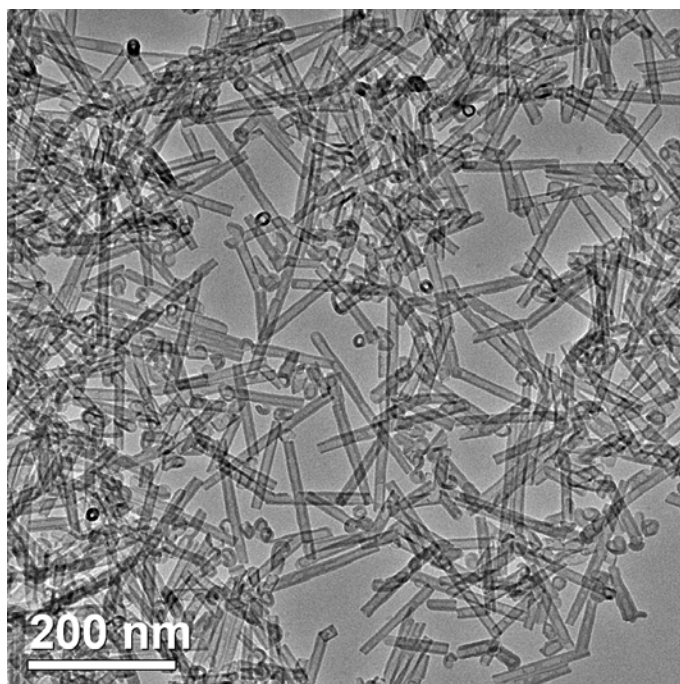


Figure S3 Typical TEM image of Mg₃Si₂O₅(OH)₄ nanotubes (J. Phys. Chem. C 2009, 113, 10441).

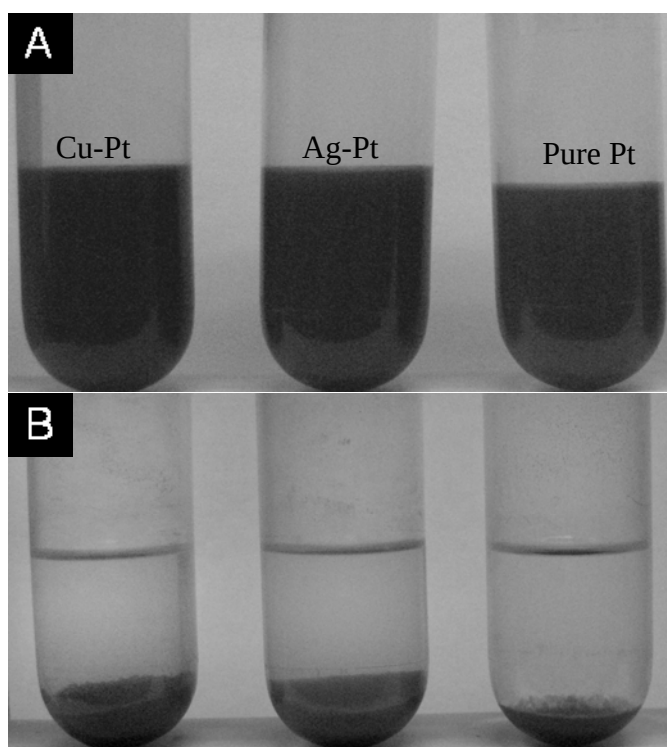


Figure S4 Digital images of BNMNs toluene solution before (a) and after (b) the addition of Mg₃Si₂O₅(OH)₄ powder by stirring for 30min.

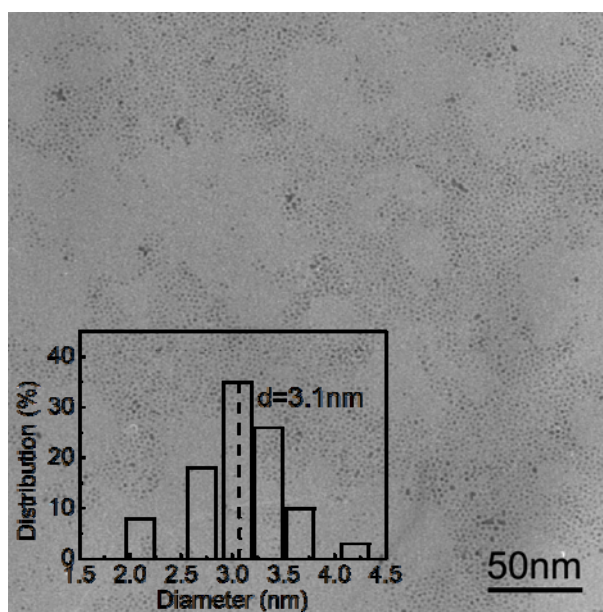


Figure S5 TEM image of pure Pt nanoparticles reduced by NaBH_4 without Cu cores. The inset is the size distribution histogram.