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A One-step and Scalable Production Route to Metal Nanocatalyst Supported Polymer Nanospheres *via* Flash NanoPrecipitation

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Experimental Section

FNP of metal@PS-*b*-PVP(denoted **P1**): a syringe containing 1 mL of 3 mg/mL PS_{793k}-*b*-PVP_{35k} (PDI=1.08, purchased from Polymer Source, Inc.)) in THF was placed at the inlet of Stream 1, and a syringe containing 1 mL of 0.45 mg/mL $HAuCl_4$ in H_2O was placed at the inlet of Stream 2. Subsequently, fluid was expressed manually from both syringes and merged into a mixing stream. The mixed stream was then diluted into a 10 mL water reservoir containing 1 mg $NaBH_4$ and 10 mg SDS. Control of composites was realized by changing the feed concentration using the same set-up (Details on the synthesis parameters are listed in Table S1). Pt@PS-*b*-PVP was prepared by replacing Stream 2 with 1 mL of 3 mg/mL H_2PtCl_6 in H_2O.

Catalytic study: 1 mL of 0.1 mM *p*-nitrophenol was mixed with a freshly prepared aqueous solution of $NaBH_4$ (2 mL, 0.1M). Au@PS-*b*-PVP(**P1**) (250μg) was then added. UV/Vis absorption spectra were recorded to monitor the change in the reaction mixture after the removal of nanoparticles. After the reduction process was completed, the catalyst was separated from the mixture and dried in a vacuum oven overnight for reuse in the next cycle – this process was repeated 5 times.

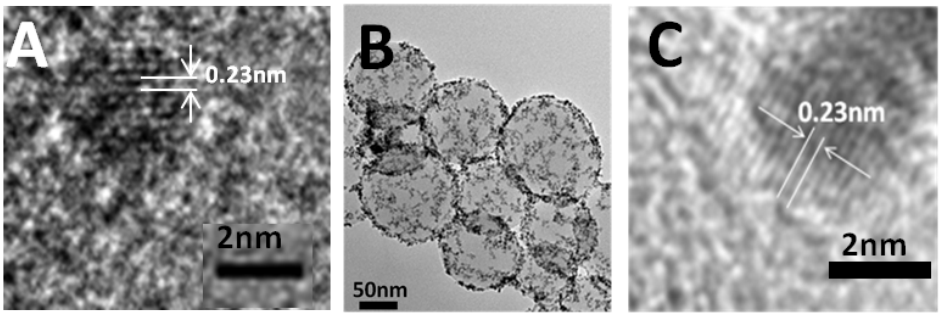

Figure S1 TEM images of a)Au@PS-*b*-PVP and b,c)Pt@PS-*b*-PVP

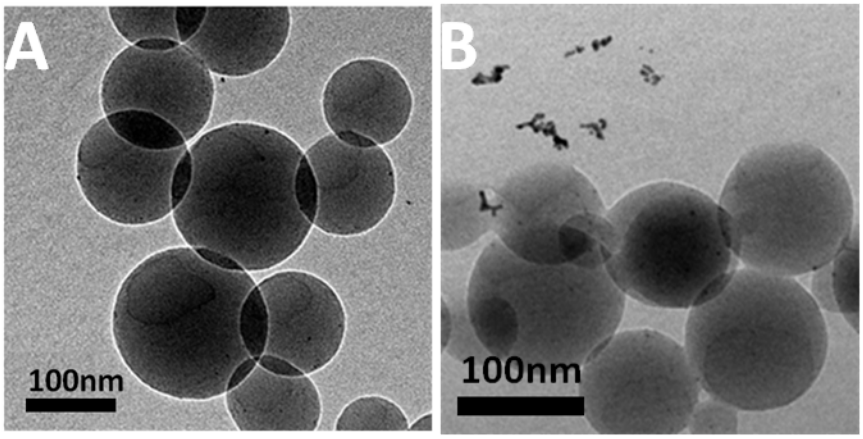

Figure S2 TEM images of nanoparticles obtained through FNP using PS in THF as Stream 1 (feeding concentration: 3mg/mL PS/THF and 0.45mg/mL $HAuCl_4/H_2O$)

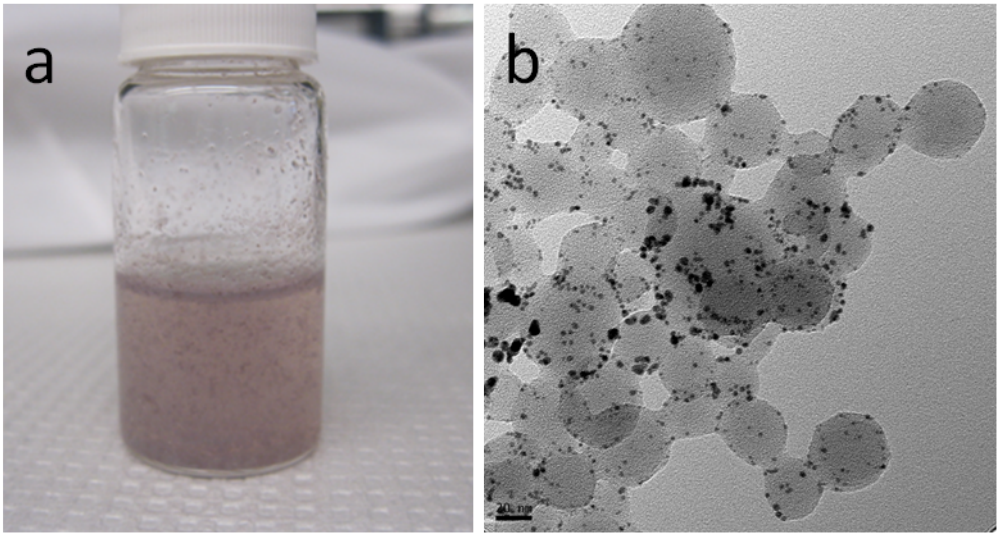

Figure S3 a)Photograph and b)TEM image illustrating the aggregation of Au@PS-*b*-PVP in the absence of SDS

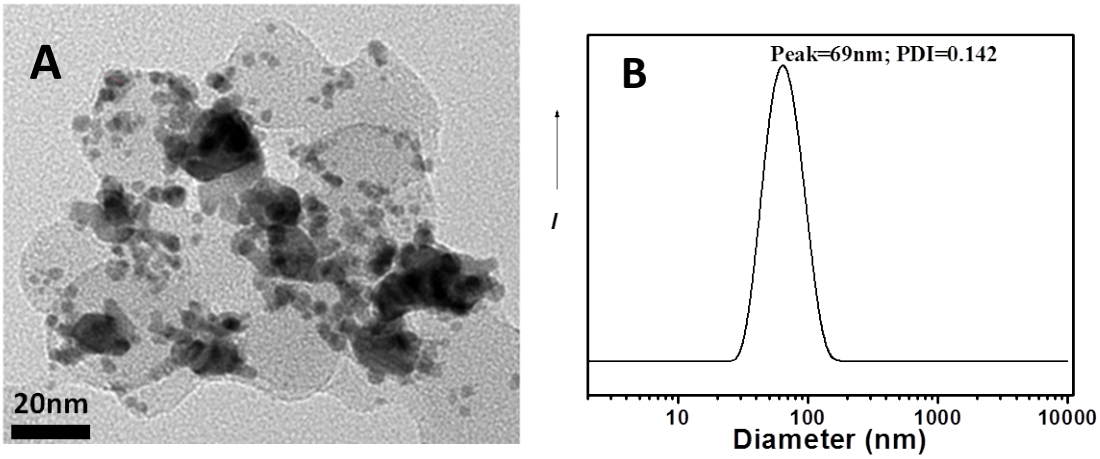

Figure S4 a)TEM and b) DLS of **P5**

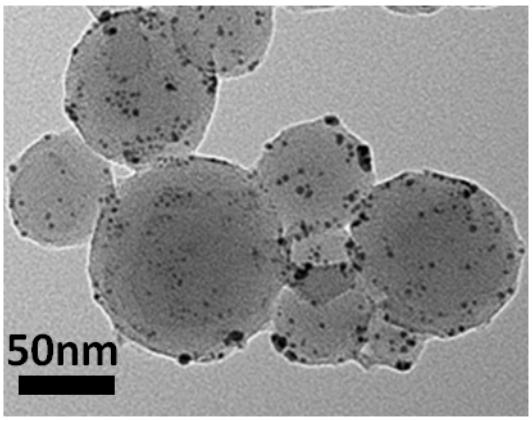

Figure S5 TEM images of Au@PS-*b*-PVP (**P1**) nanocatalysts after 5 times re-uses

Table S1 Preparation parameters of Au@PS-*b*-PVP through FNP

	Stream 1 PS-*b*-PVP /THF (mg/mL)	Stream 2 $HAuCl_4$/H2O (mg/mL)
P1	3	0.45
P2	3	0.15
P3	3	0.9
P4	6	0.45
P5	1	0.45
P6	1	0.15