PdCu alloy nanodendrites with tunable composition as highly active electrocatalysts for methanol oxidation

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Table S1. ICP-AES and ECSA data (normalized to Pd) of the PdCu alloy nanostructures including the commercial Pd/C.

Samples	Molar ratios of Pd/Cu precursors	Atomic ratios of Pd/Cu	Molecular formula	ECSA (m^2/g)
PdCu alloys	4:1	3.39:1	$Pd_{77}Cu_{23}$	23.12
	2:1	1.89:1	$Pd_{65}Cu_{35}$	34.16
	1:1	0.91:1	$Pd_{48}Cu_{52}$	40.49
	2:3	0.74:1	$Pd_{43}Cu_{57}$	23.89
	1:3	0.54:1	$Pd_{35}Cu_{65}$	24.82
Pd/C	/	/	/	33.0

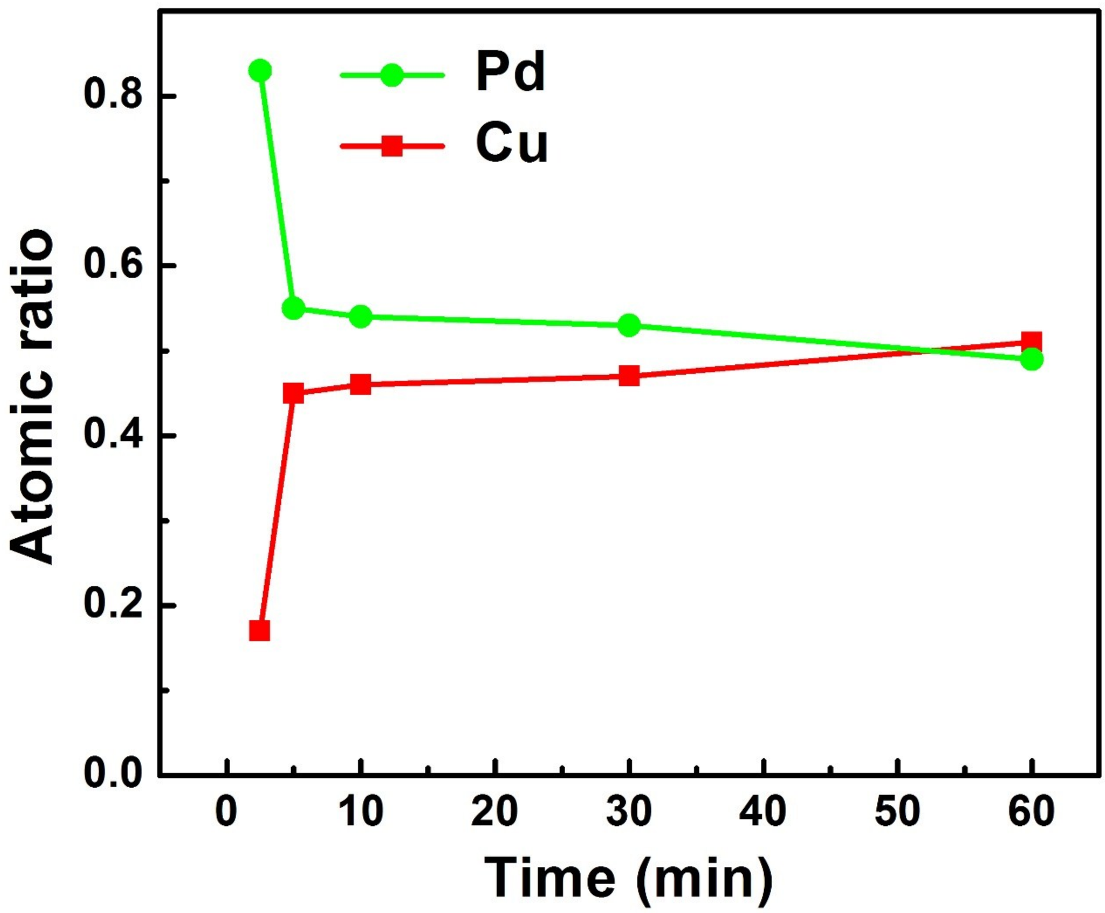

Figure. S1 ICP-AES data of the PdCu nanostructures prepared using the standard procedure, except for different period of the reaction from 2.5 to 5, 10, 30 and 60 min.

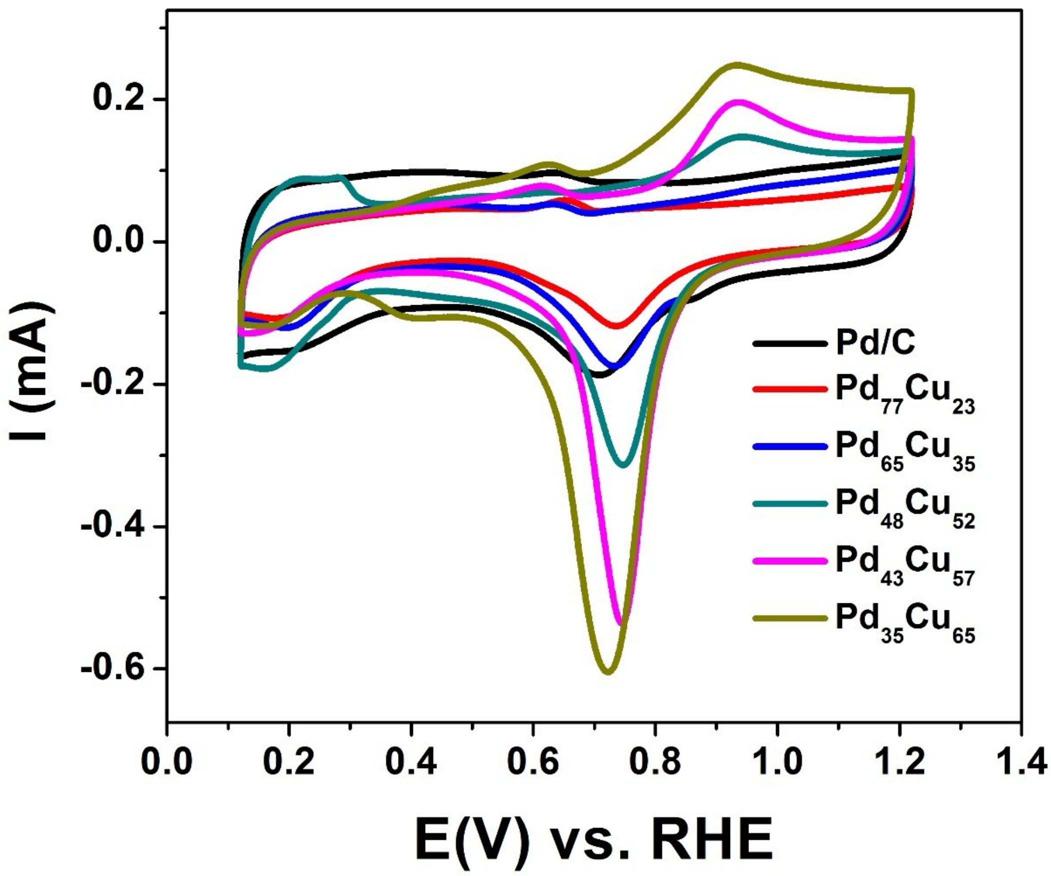

Figure. S2 Cyclic voltammograms (CVs) of the five PdCu/C catalysts and commercial Pd/C in an Ar-saturated 0.1 M KOH solution at a sweep rate of 50 mV/s

Table S2. Comparison of the critical MOR parameters for our $Pd_{35}Cu_{65}$ alloy nanodendrites with other typical PdCu and Pd catalysts with high performance.

Catalysts	Test condition including the electrolyte and scanning rate	Activity				Ref
		Specific activity (mA/cm^2)	Enhancement factor with Pd/C as a reference (times)	Mass activity (mA/mg_{Pd})	Enhancement factor with Pd/C as a reference (times))	
Our $Pd_{35}Cu_{65}$ alloy nanodendrites	0.1M KOH+0.5M CH_3OH 50mV/s	0.54	9.3	135	7.6	This work
Pd_2Cu nanoparticles	0.5M KOH+0.5M CH_3OH 50mV/s	/	/	220	1.4	49
Porous PdCu nanoparticles	0.5M KOH+0.5M CH_3OH 50mV/s	/	/	363	2.0	33
Pd_3Cu alloy nanoparticles	1M KOH+1M CH_3OH 50mV/s	2.05	3.0	778.98	3.7	50
Pd_4Cu alloy nanoparticles	1M KOH+1M CH_3OH 25mV/s	29	4.2	/	/	51
$Pd_{85}Cu_{15}$ alloy nanoparticles	1M KOH+1M CH_3OH 50mV/s	/	/	588.7	5.8	31
PdCu/VrGO	1M KOH+1M CH_3OH 50mV/s	/	/	762.8	7.1	47
Porous Pd nanoflowers	0.5M KOH+0.25M CH_3OH 1mV/s	/	/	about 26	1.7	52
Unusual Pd nanoparticles	1M KOH+1M CH_3OH 50mV/s	2.39	6.6	about 90	1.7	53
Monodispersed Pd nanospheres	1M NaOH+1M CH_3OH 50mV/s	5	2.6	/	/	54

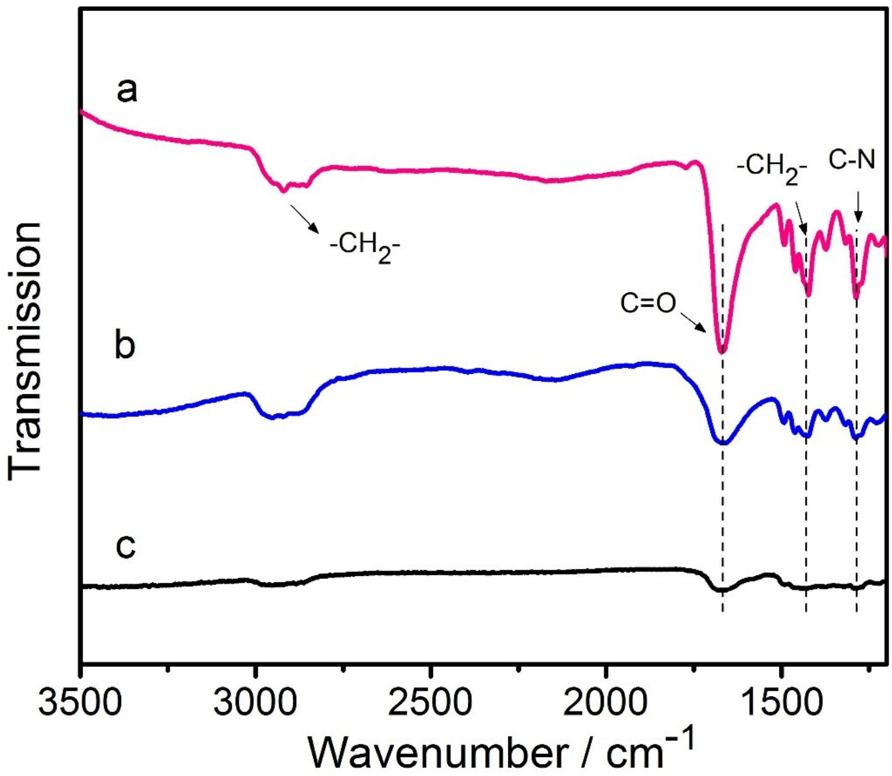

Figure. S3 FTIR spectra of the $Pd_{48}Cu_{52}$ nanodendrites treated by different treatment methods. The $Pd_{48}Cu_{52}$ nanodendrites (a) were washed by alcohol for one time, (b) were washed by alcohol for four times, and (c) were treated by tert-butylamine and $NaBH_4$ and washed by alcohol for three times.