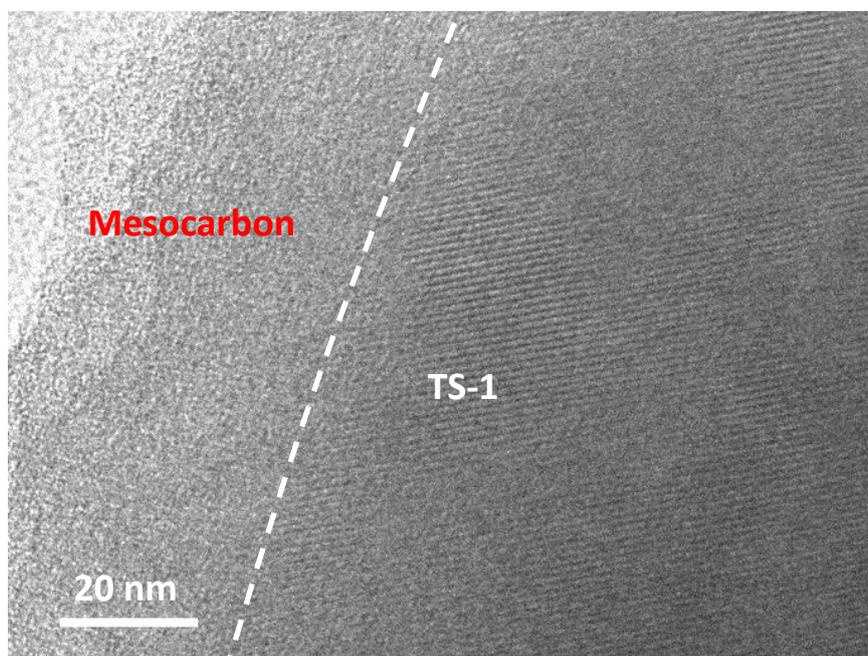


## Electronic Supplementary Information for

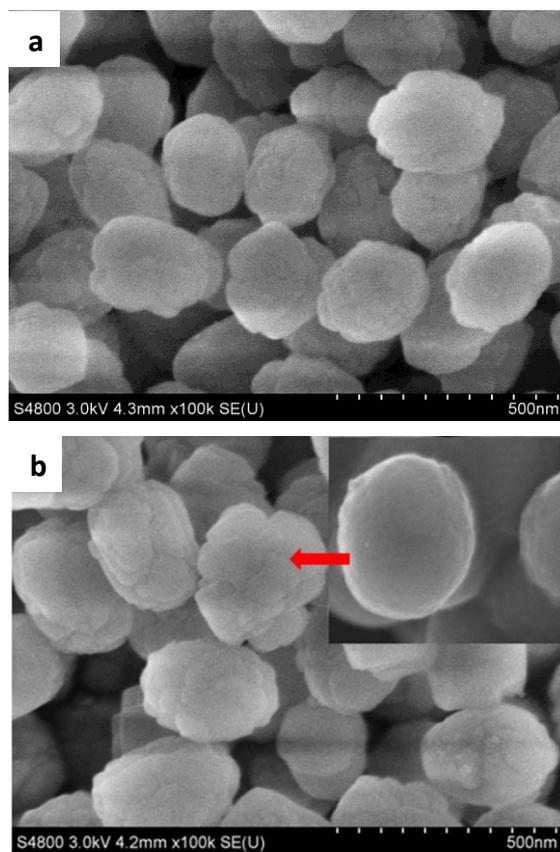
# Synthesis of core-shell structured TS-1@mesocarbon material and its application as a tandem catalyst

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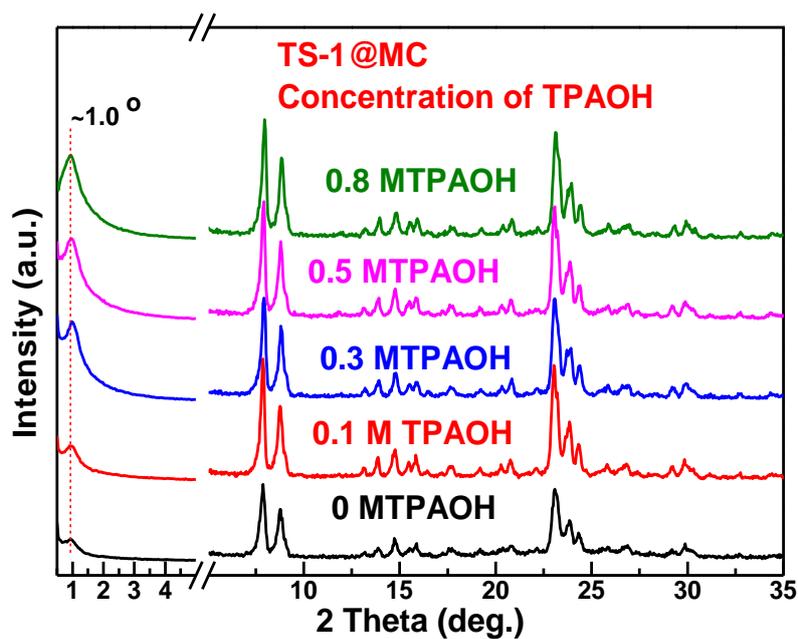
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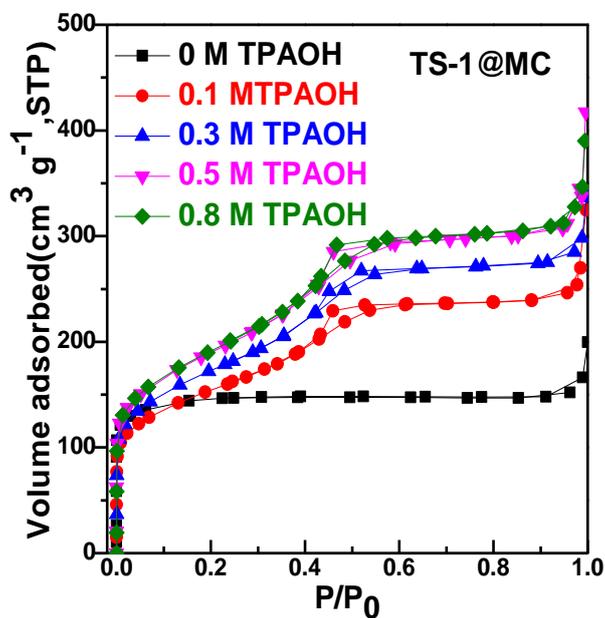
**Fig. S1** High resolution TEM image of TS-1@MC.



**Fig. S2** SEM images of TS-1 (a) and TS-1@MC-TPAOH after calcination in air at 873 K for 6 h. The insert shows the image of uncalcined TS-1@MC-TPAOH.



**Fig. S3** XRD patterns of TS-1@MC prepared by etching with TPAOH at different concentrations. Other conditions: 338 K and 4 h.

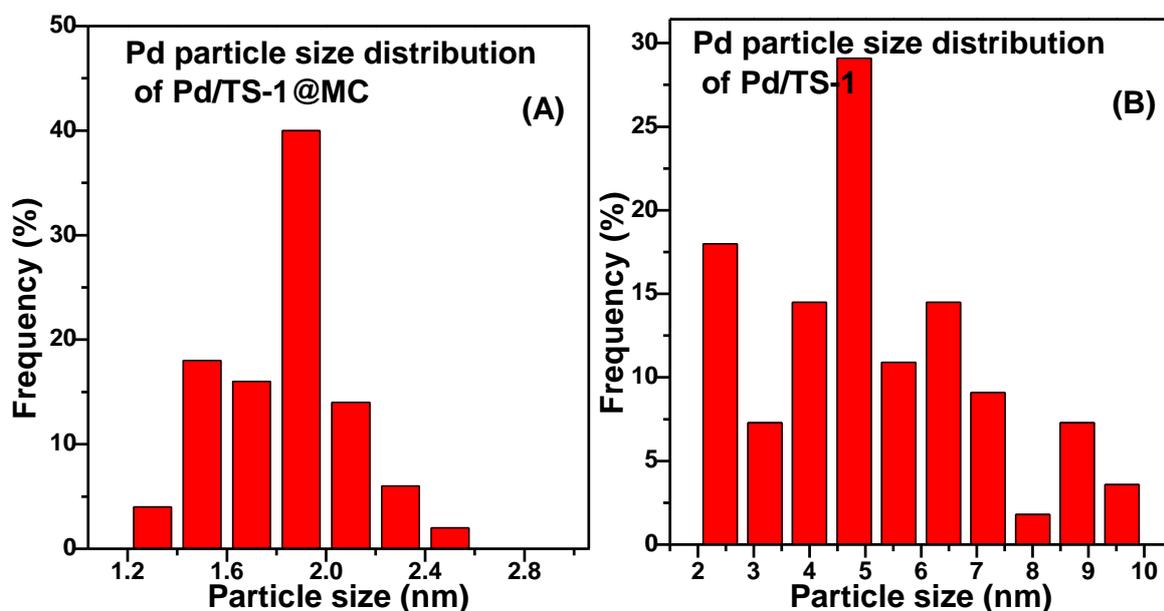


**Fig. S4**  $N_2$  adsorption/desorption isotherms of TS-1@MC prepared by etching with TPAOH at different concentration at 338 K for 4 h. The TPAOH was not removed by calcination in vacuum after TS-1@MS/C etched by TPAOH.

**Table S1** Physicochemical properties of TS-1@MC etched with TPAOH at different concentration <sup>a</sup>

No.	TPAOH (M)	Yield (wt%)	Carbon content (%)	Si/Ti ratio	S <sub>BET</sub> (m <sup>2</sup> g <sup>-1</sup> )	S <sub>ext</sub> (m <sup>2</sup> g <sup>-1</sup> )	V <sub>tot</sub> (cm <sup>3</sup> g <sup>-1</sup> )	D <sub>meso</sub> (nm)	D <sub>micro</sub> (nm)
1	0	100	22.0	65	360	32.5	0.259	-	0.56
2	0.1	80.0	27.3	50	533	227	0.463	3.28	0.51
3	0.3	76.0	29.6	45	605	270	0.473	2.94	0.84
4	0.5	71.7	29.1	39	657	347	0.561	2.94	0.51
5	0.8	70.5	30.1	40	661	379	0.547	2.94	0.51

<sup>a</sup> Other conditions: 338 K, 4 h. Yield in grams of solid after treatment per gram of starting material. The TPAOH was not removed by calcination in vacuum after TS-1@MS/C etched by TPAOH.



**Fig. S5** Pd particle size distribution of Pd/TS-1@MC (A) and Pd/TS-1 (B).