Supporting Information

New insights into the photocatalytic activity of 3-D core-shell P25@silica nanocomposites: impact of mesoporous coating

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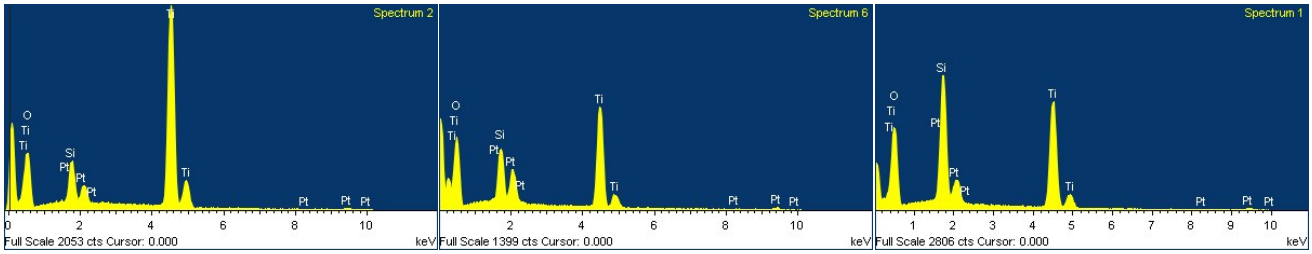

Figure S1 EDS analysis of bulk powders of P25@mSiO$_2$-25, P25@mSiO$_2$-50, and P25@mSiO$_2$-100.

Table S1 Weight ratio of TiO_2 and SiO_2 in each sample

	Average Ti/Si atom ratio	TiO_2 (wt. %)	SiO_2 (wt. %)
P25-bare	-	100	0.0
P25@mSiO$_2$-25	7.2	90.0	10.0
P25@mSiO$_2$-50	2.9	79.0	21.0
P25@mSiO$_2$-100	1.4	65.0	35.0

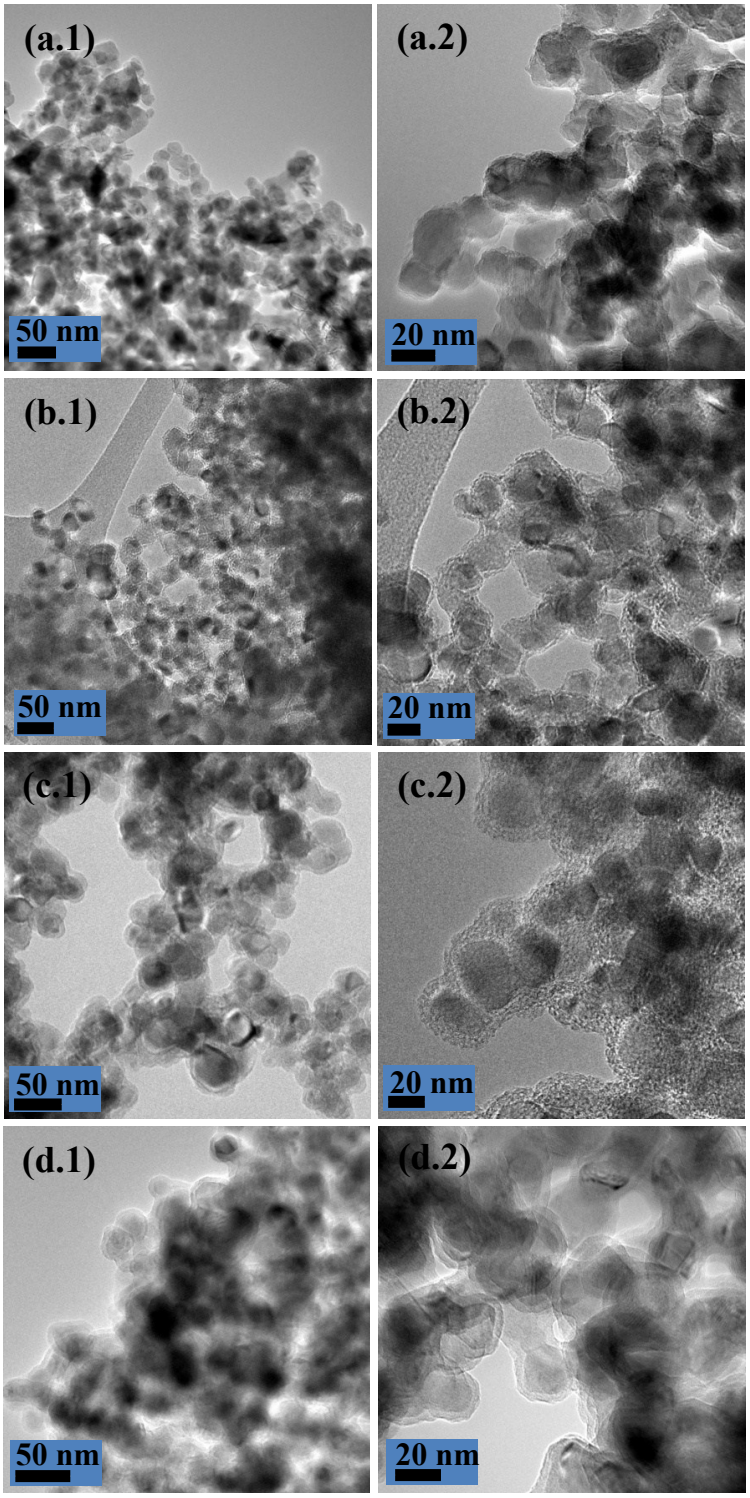

Figure S2 TEM images of P25@mSiO$_2$ obtained with different TEOS amounts: (a) 25 μL, (b) 50 μL, (c) 100 μL. (d) TEM images of P25@SiO$_2$ (nonporous) with 100 μL of TEOS.

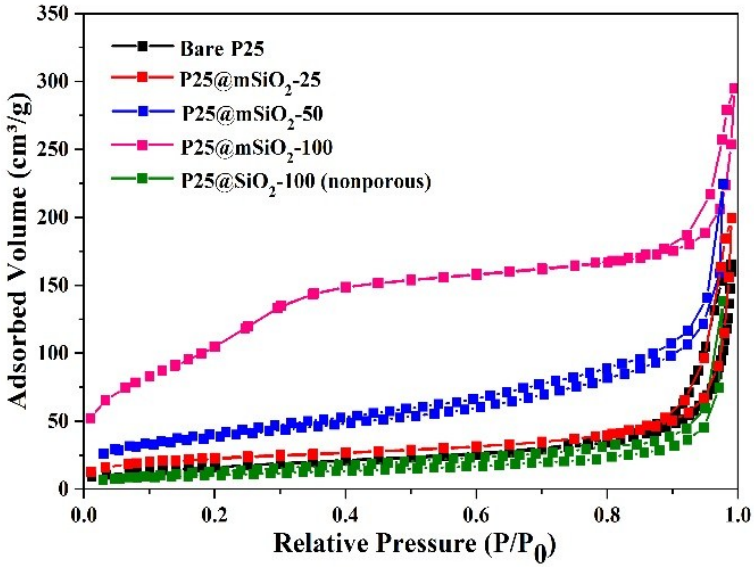

Figure S3 N_2 adsorption-desorption isotherms of bare P25, P25@mSiO_2 (with different SiO_2 content), and P25@SiO_2-100 (nonporous).

Table S2 Surface area of different P25@mSiO_2 samples.

Samples	Surafce area (m^2/g)
Bare P25	59.6
P25@mSiO_2-25	79.9
P25@mSiO_2-50	135.5
P25@mSiO_2-100	415.7
P25@SiO_2-100 (nonporous)	36.1

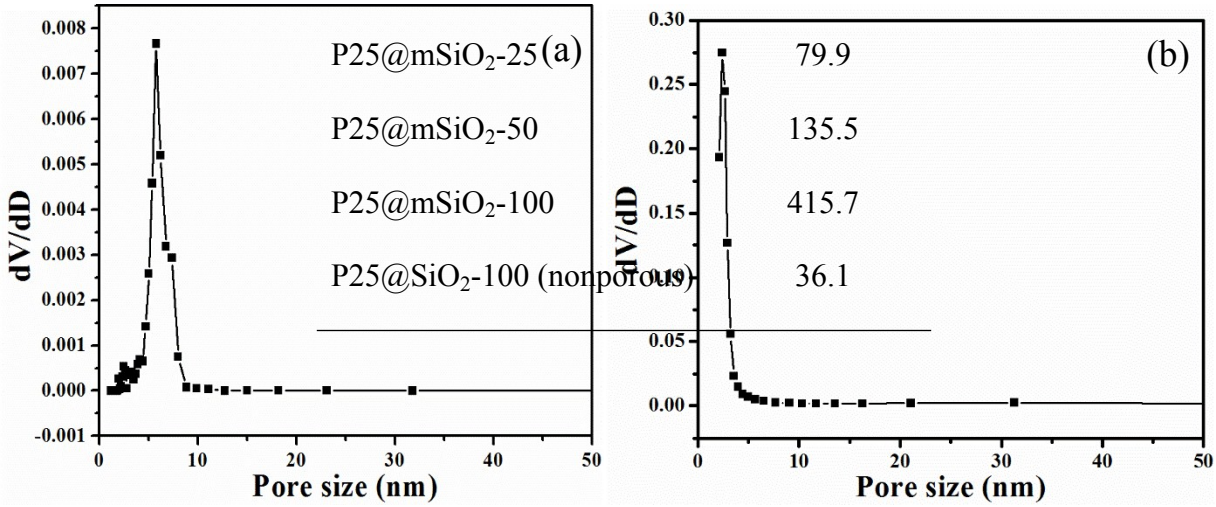

Figure S4 Pore size distribution of P25 (a) and P25@mSiO$_2$-100 (b).

Table S3 Zeta-potential of each sample.

	P25	P25@mSiO$_2$-25	P25@mSiO$_2$-50	P25@mSiO$_2$-100	P25@SiO$_2$-100 (nonporous)
Zeta-potential (mV)	21.6	-27.0	-21.0	-23.5	-23.8

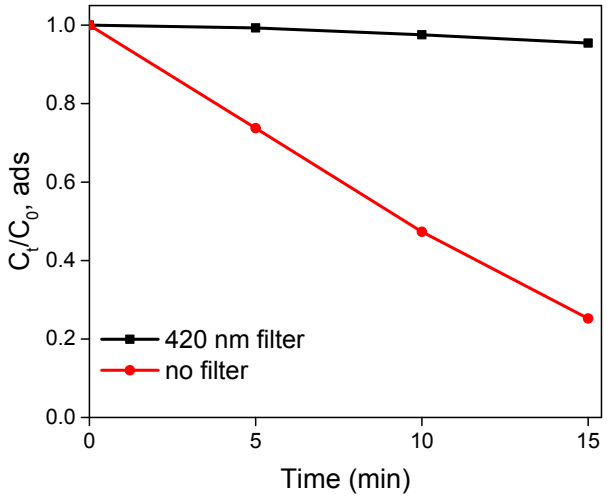

Figure S5 Photodegradation of MO with (black) and without (red) 420 nm optical filter.

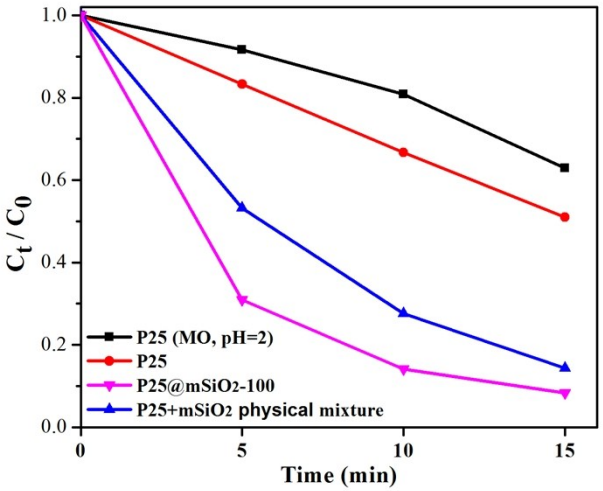

Figure S6 MO photo-degradation for P25 at neutral (red) and acidic (pH 2) solutions (black), P25@$mSiO_2$-100 (purple) and physical mixture of P25 and $mSiO_2$ (blue) following the weight ratio of P25@$mSiO_2$-100.

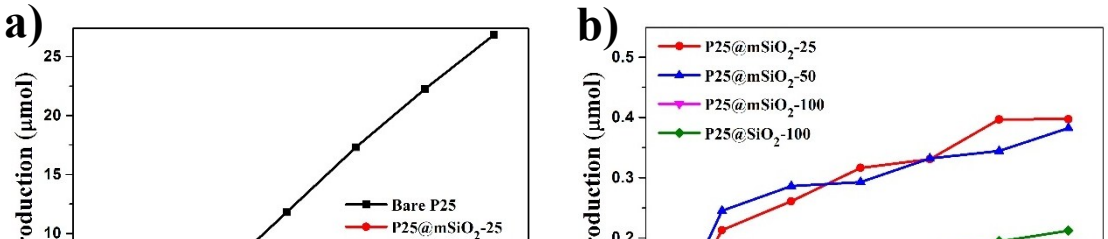

Figure S7 (a) Photocatalytic hydrogen evolution by bare P25, P25@SiO_2, and P25@mSiO_2 samples. (b) Magnified results of hydrogen evolution by the P25@SiO_2 samples.

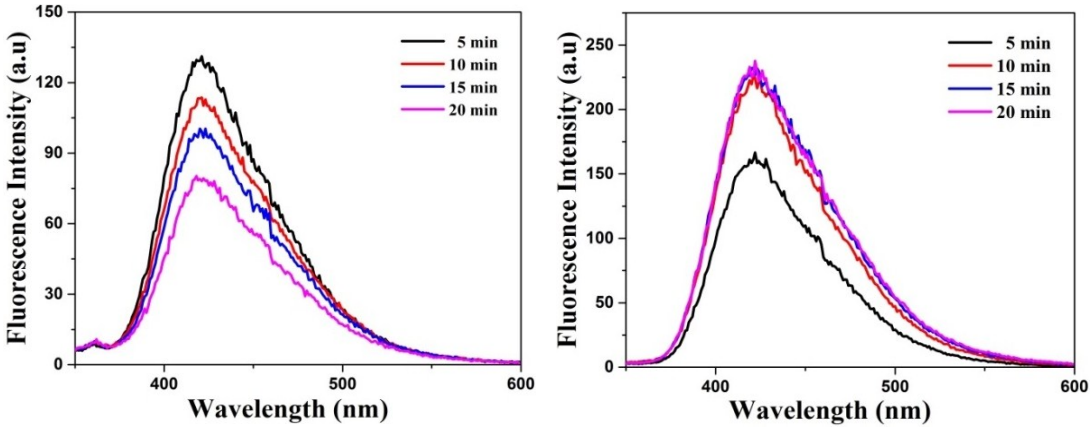

Figure S8 Fluorescence spectral changes observed during illumination of (a) P25 and (b) P25@mSiO_2-100. Each fluorescence spectrum was recorded every 5 min.