Supporting information for

Controllable Synthesis of Peapod-Like TiO_2@GO@C Electrospun Nanofiber Membranes with Enhanced Mechanical Property and Photocatalytic Degradation Ability towards Methylene Blue

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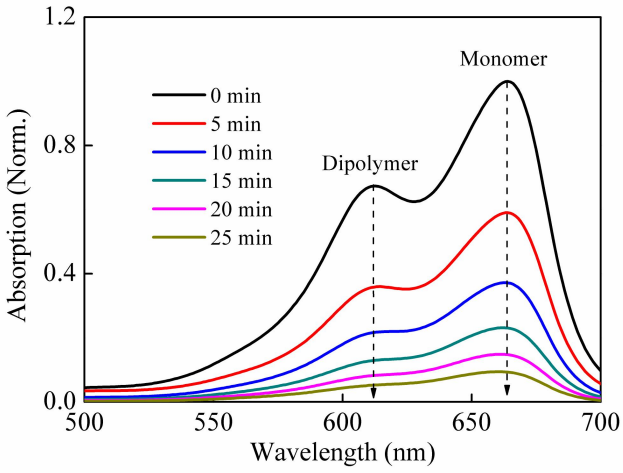

Figure S1. UV-Visible absorption spectra of MB solution with varied photocatalytic degradation time.

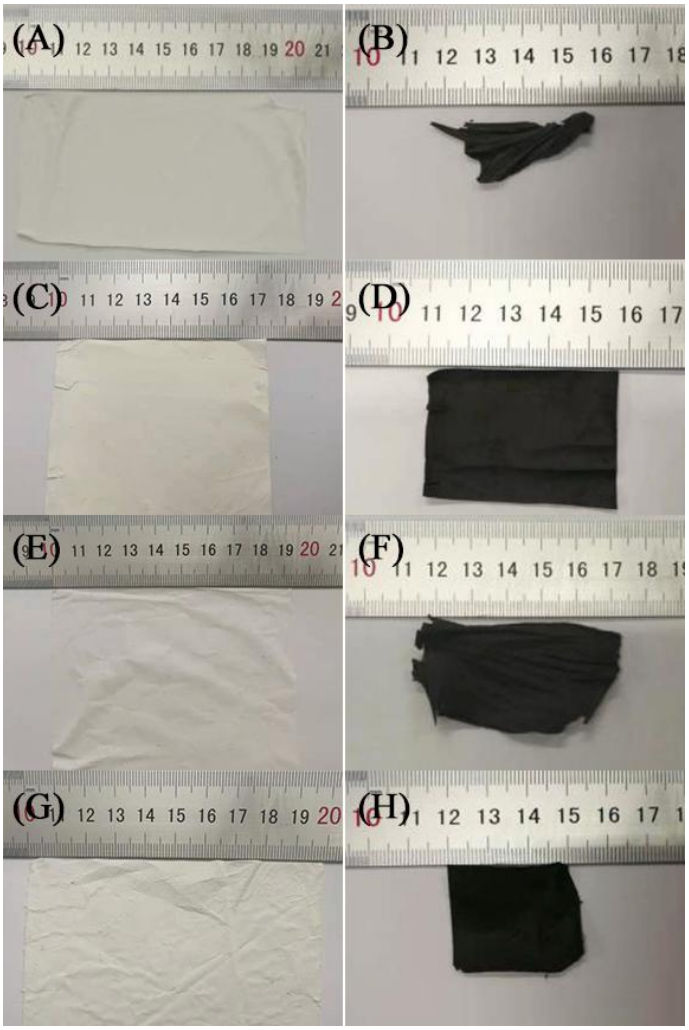

Figure S2. (A) PAN membranes, (B) C nanofiber membranes, (C) TiO_2@PAN membranes, (D) TiO_2@C nanofiber membranes, (E) GO@PAN membranes, (F) GO@C nanofiber membranes, (G) TiO_2@GO@PAN membranes and (H) TiO_2@GO@C nanofiber membranes.

Table S1. Lifetime derived from the corresponding time-resolved PL spectra of C, TiO_2@C, GO@C and TiO_2@GO@C nanofiber membranes.

Materials	Time-resolved PL			
	τ_1, ns	τ_2, ns	τ_3, ns	τ_{aver}, ns
C	0.05	0.25	0.88	0.064
TiO_2@C	0.04	0.23	1.59	0.050
GO@C	0.04	0.24	0.82	0.054
TiO_2@GO@C	0.03	0.22	0.97	0.041

Table S2. Electrochemical parameters derived from the corresponding Tafel spectra of C, TiO_2@C, GO@C and TiO_2@GO@C nanofiber membranes.

Materials	Tafel	
	Polarized voltage, V	Log current, A
C	-0.21	-7.10
TiO_2@C	-0.18	-7.63
GO@C	-0.20	-6.05
TiO_2@GO@C	-0.15	-8.10

Table S3. Mechanical properties of C, TiO_2@C, GO@C and TiO_2@GO@C nanofiber membranes.

Materials	Strength /cN/dtex	Length /mm	Elongation /%	Fracture work /cN • mm
C	14.50	0.01	0.09	0.28
TiO_2@C	91.05	0.07	0.71	3.58
GO@C	31.61	0.04	0.37	0.77
TiO_2@GO@C	198.04	0.08	0.84	8.42

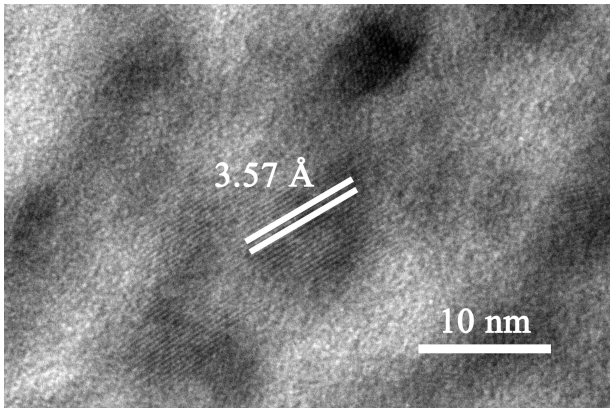

Figure S3. HRTEM image of TiO_2@C nanofiber membranes. The lattice figure of these nanoparticles shows a value of 3.57 Å, which is consistent with the crystal structure of anatase phase TiO_2.

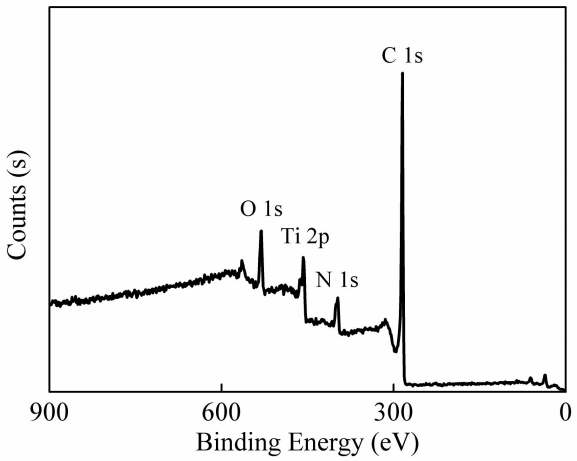

Figure S4. XPS spectra of TiO_2@GO@C nanofiber membranes.

Table S4. Element contents derived from the corresponding XPS spectra of TiO_2@GO@C nanofiber membranes.

TiO_2@GO@C nanofiber membranes	Atomic %
C 1s	77.02
N 1s	10.35
Ti 2p	4.51
O 1s	8.11

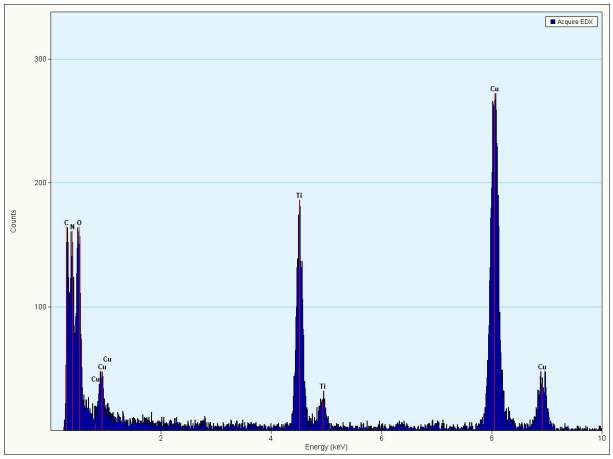

Figure S5. EDS images of TiO_2@GO@C nanofiber membranes.

Table S5. Element contents derived from corresponding EDS images of TiO_2@GO@C nanofiber membranes.

Selected area	Atomic %
C K	26.97
N K	44.36
O K	19.11
Ti K	9.54

Table S6. Element peak positions derived from the corresponding XPS spectra of TiO_2@C and TiO_2@GO@C nanofiber membranes.

Materials	Peak positions of C elements, eV			Peak positions of N elements, eV	
	C 1s	C=O	C-OR	Ti-N	O-N
TiO_2@C	284.7	285.8	-	398.3	400.1
TiO_2@GO@C	284.7	285.8	286.8	397.7	400.9
Materials	Peak positions of Ti elements, eV				Peak positions of O elements, eV
	Ti 2p	O-Ti-O	Ti-O	Ti 4p1	O-H	Ti-O
TiO_2@C	-	-	458.5	464.2	530	532.8
TiO_2@GO@C	455.5	456.8	458.0	462.5	530	531.6

Table S7. Photocatalytic degradation efficiencies of TiO_2@GO@C nanofiber membranes with varied additional amount of GO and degradation times.

	C/C_0						
	0 min	30 min	60 min	90 min	120 min	150 min	180 min
Dark condition	1	0.994	0.991	0.988	0.973	0.965	0.962
TiO_2@C	1	0.590	0.372	0.232	0.149	0.094	0.037
TiO_2@0.2-GO@C	1	0.603	0.326	0.168	0.070	0.036	0.016
TiO_2@0.3-GO@C	1	0.422	0.213	0.111	0.056	0.022	0.015
TiO_2@0.4-GO@C	1	0.660	0.409	0.241	0.159	0.110	0.073
TiO_2@0.6-GO@C	1	0.643	0.423	0.342	0.229	0.136	0.112

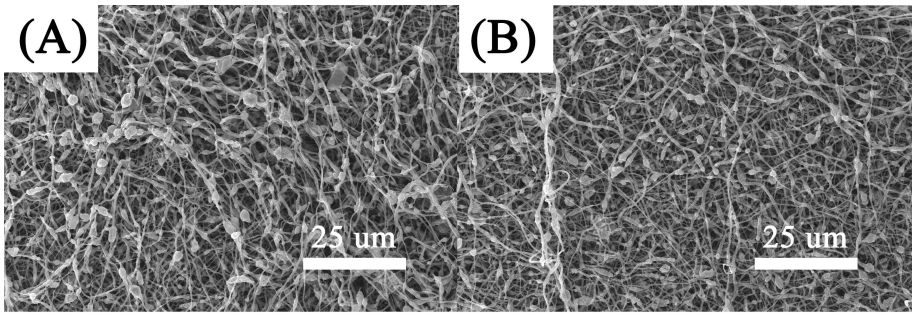

Figure S6. SEM images of (A) TiO_2@0.3-GO@C and (B) TiO_2@0.4-GO@C nanofiber membranes.

Table S8. Photocatalytic properties of recent photocatalysis.

Materials	Pollutants	Photocatalytic degradation efficiency	References
rGO-TiO_2	MO	82% in 3h	38
TiO_2-graphene	MB	75% in 3h	39
GO–TiO_2	MB	33% in 1h	40
Gd-TiO_2-GO	IC	97%	41
TiO/GO/Hemin	RhB	99% in 2h	42
TiO_2@GO@C nanofiber membranes	MB	98.5% in 3h	This work

Table S9. Mechanical properties of TiO_2@GO@C nanofiber membranes with vary amount of GO.

TiO_2@GO@C nanofiber membrane	Strength /cN/dtex	Length /mm	Elongation /%	Fracture work /cN·mm
0	91.05	0.07	0.71	3.58
0.20%	166.73	0.08	0.79	7.49
0.30%	356.07	0.2	2.04	39.62
0.40%	254.29	0.13	1.29	18.79
0.60%	242.41	0.08	0.83	10.37