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Electronic Supplementary Information (ESI)

Size-dependent interaction of plasma with anatase TiO_2 nanoparticles

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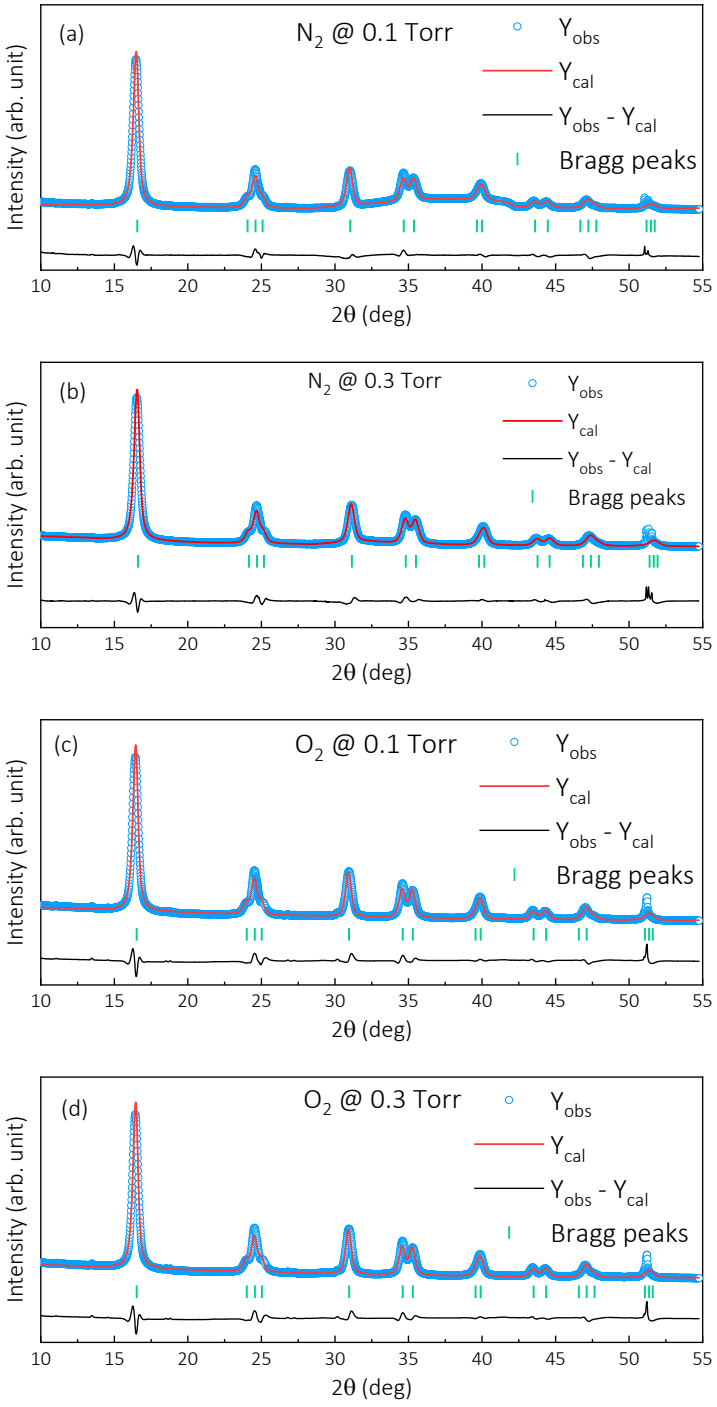

(a)
N2 @ 0.1 Torr
Yobs
Ycal
Yobs - Ycal
Bragg peaks
Intensity (arb. unit)
10 15 20 25 30 35 40 45 50 55
2θ (deg)
(b)
N2 @ 0.3 Torr
Yobs
Ycal
Yobs - Ycal
Bragg peaks
Intensity (arb. unit)
10 15 20 25 30 35 40 45 50 55
2θ (deg)
(c)
O2 @ 0.1 Torr
Yobs
Ycal
Yobs - Ycal
Bragg peaks
Intensity (arb. unit)
10 15 20 25 30 35 40 45 50 55
2θ (deg)
(d)
O2 @ 0.3 Torr
Yobs
Ycal
Yobs - Ycal
Bragg peaks
Intensity (arb. unit)
10 15 20 25 30 35 40 45 50 55
2θ (deg)

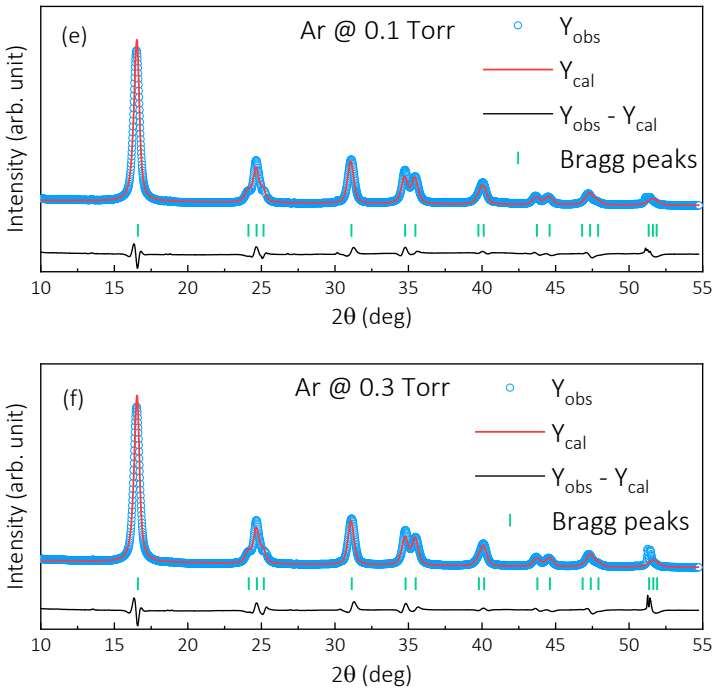


Fig. S1. (a) – (f) Rietveld refinements of the WAXS data of the treated samples with 0.1 and 0.3 Torr gas pressures of N_2, O_2, and Ar.

Table 1S. Unit cell parameters and the Rietveld refinement parameters of the treated samples with 0.1 and 0.3 Torr gas pressures of N_2, O_2, and Ar.

	N_2 @ 0.1	N_2 @ 0.3	O_2 @ 0.1	O_2 @ 0.3	Ar @ 0.1	Ar @ 0.3
a (Å)	3.836	3.822	3.845	3.826	3.826	3.824
c (Å)	9.634	9.599	9.653	9.609	9.609	9.601
R_p	2.96	2.60	2.73	2.68	2.62	2.51
R_{wp}	11.45	11.67	11.51	11.58	11.35	11.71
R_{exp}	9.94	9.71	9.23	9.29	9.18	9.49

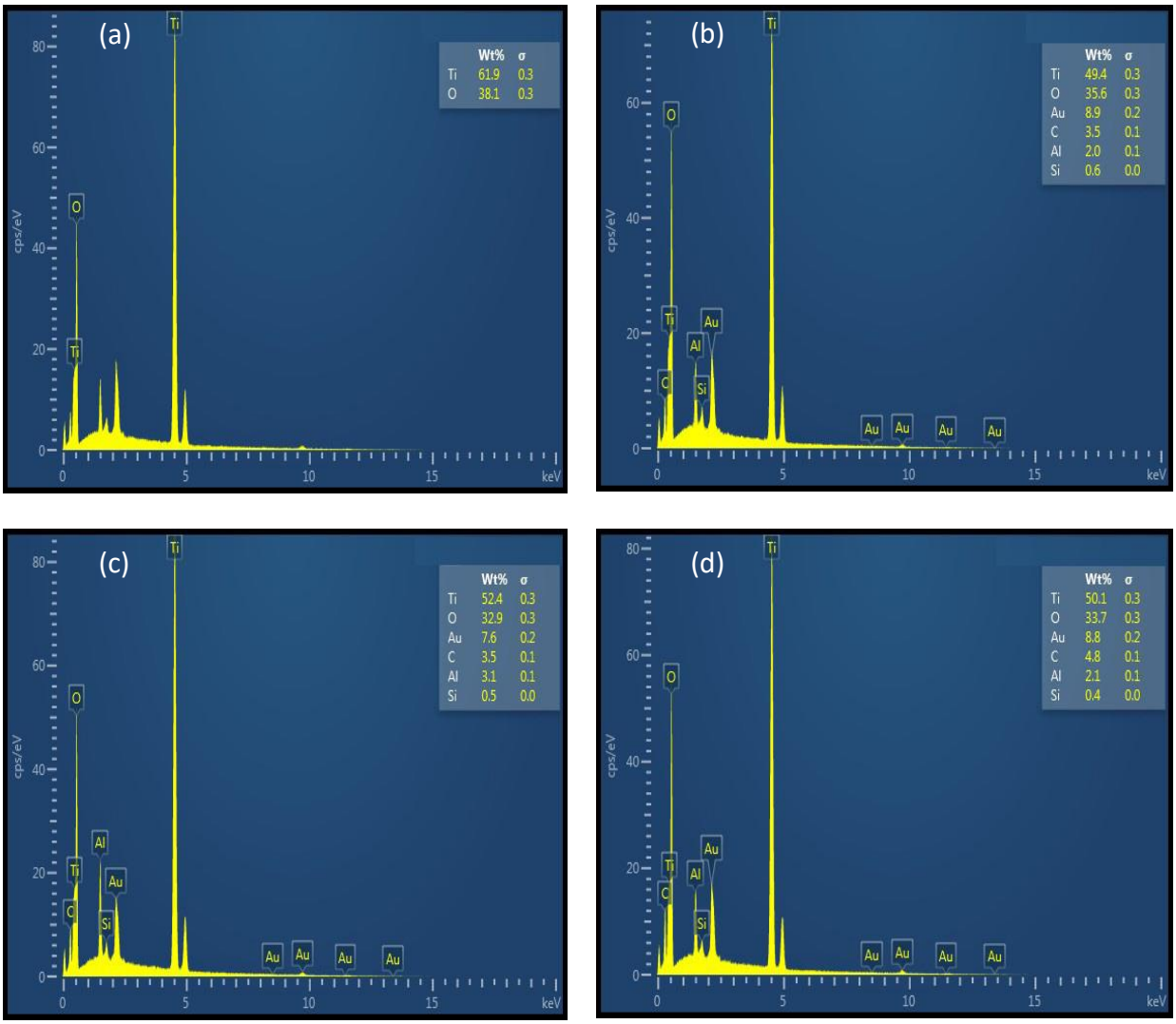
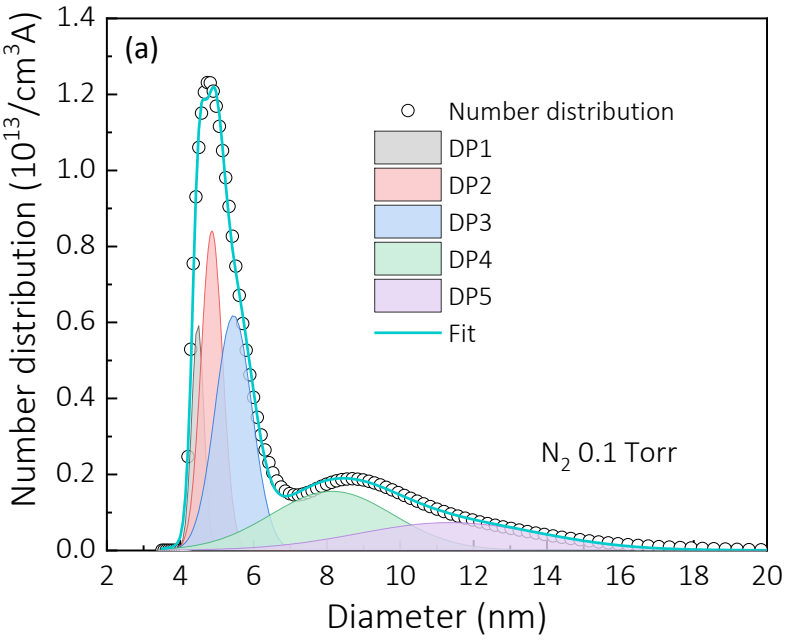
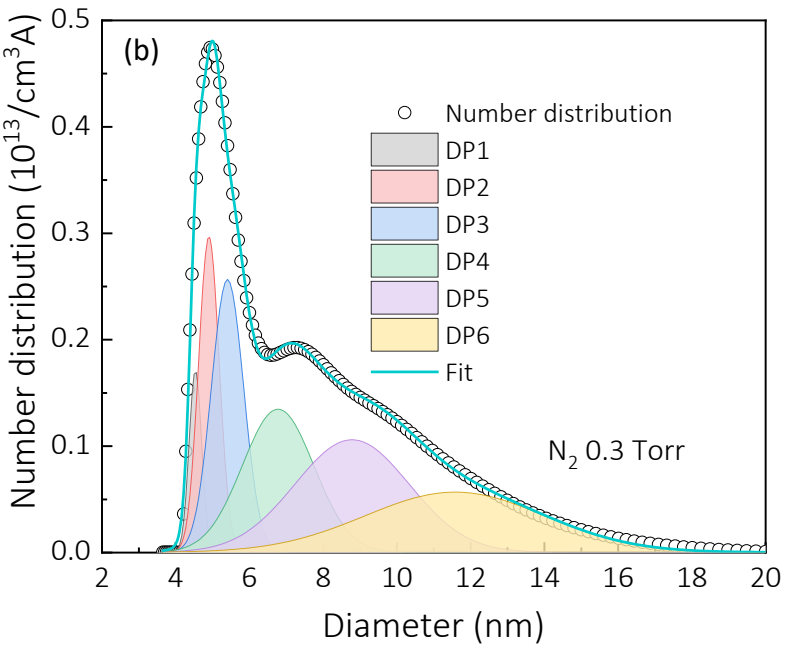


Fig. S2. EDX pattern of the pristine sample (a) and post-treated samples with Ar plasma (b) 0.1 Torr, (c) 0.3 Torr and (d) 0.6 Torr. Au contamination is due to the coating of the samples with Au to minimize charging effects on the SEM image. The presence of the other organic contaminations in the EDX spectrum is originated in the use of adhesives to keep samples on the holders.


(a)
Number distribution
DP1
DP2
DP3
DP4
DP5
Fit
N2 0.1 Torr
Number distribution (10^13/cm^3A)
Diameter (nm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
2
4
6
8
10
12
14
16
18
20


(b)
Number distribution
DP1
DP2
DP3
DP4
DP5
DP6
Fit
N2 0.3 Torr
Number distribution (10^13/cm^3A)
Diameter (nm)
0.0
0.1
0.2
0.3
0.4
0.5
2
4
6
8
10
12
14
16
18
20

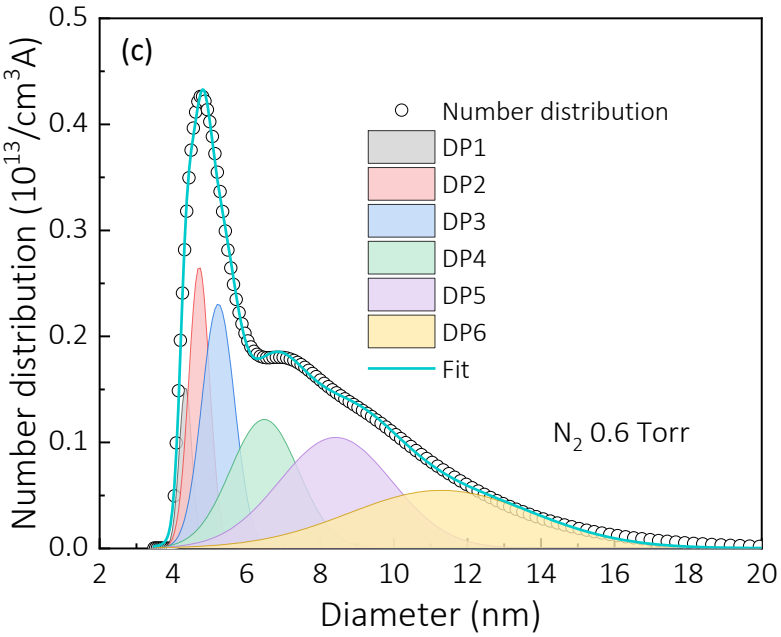
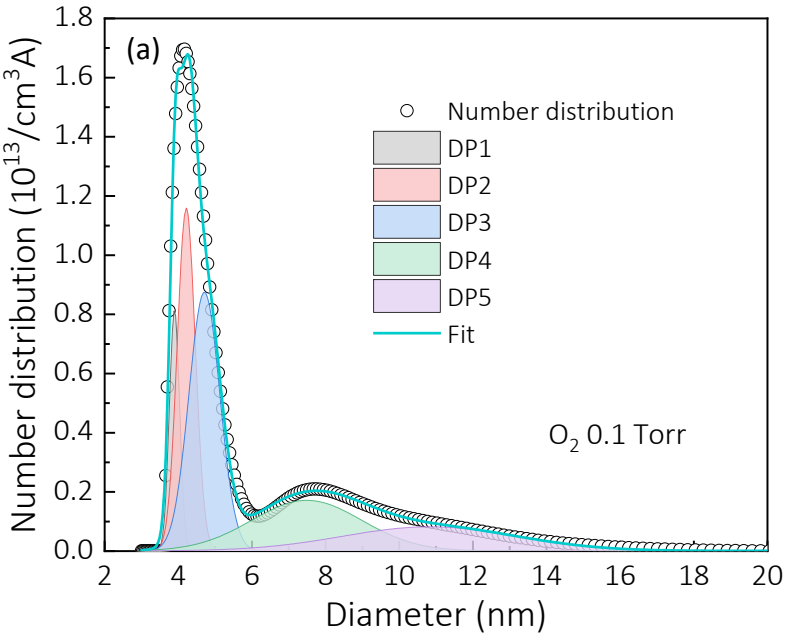
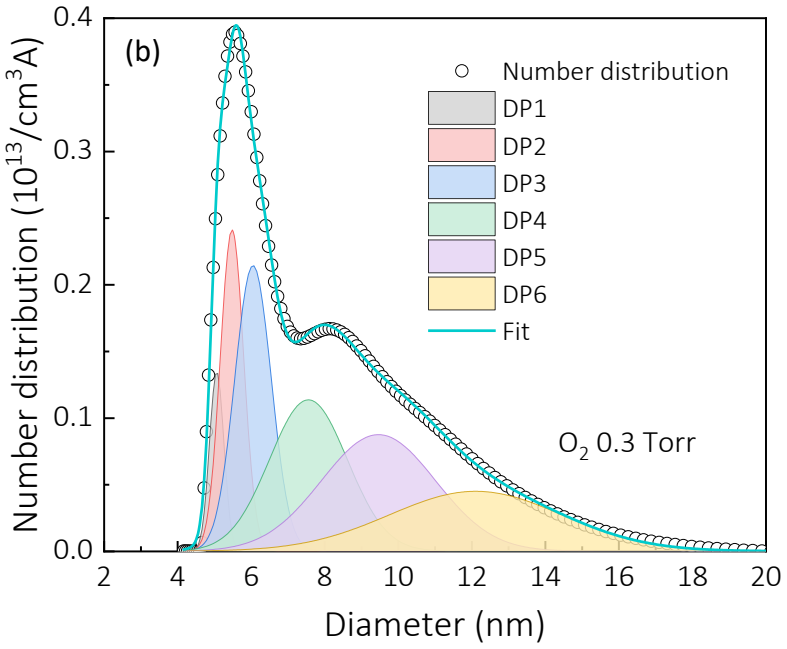


Fig. S3. The deconvolution of the number distribution of the treated sample by N_2 plasma. (a) 0.1 Torr, (b) 0.3 Torr, and (c) 0.6 Torr.


(a)
Number distribution
DP1
DP2
DP3
DP4
DP5
Fit
O_2 0.1 Torr
Number distribution (10^{13}/cm^{3}A)
Diameter (nm)


(b)
Number distribution
DP1
DP2
DP3
DP4
DP5
DP6
Fit
O_2 0.3 Torr
Number distribution (10^{13}/cm^{3}A)
Diameter (nm)

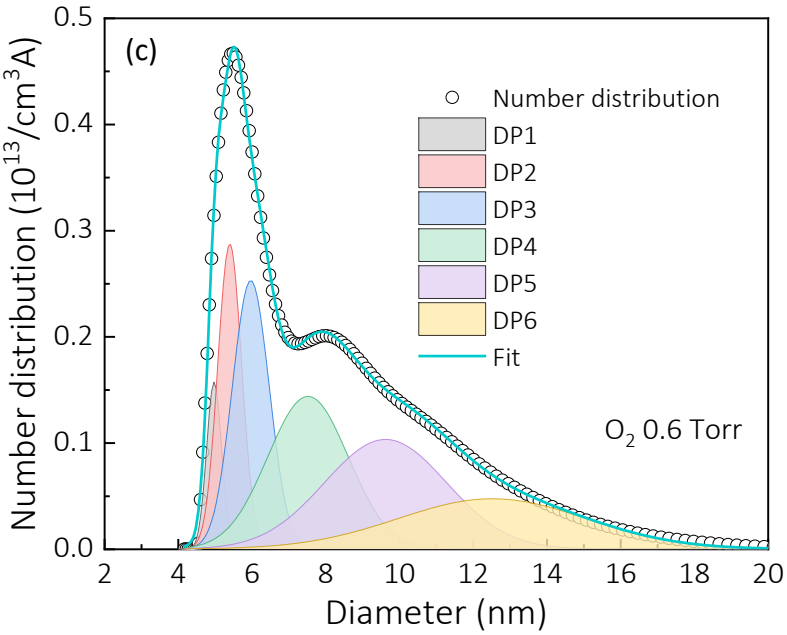
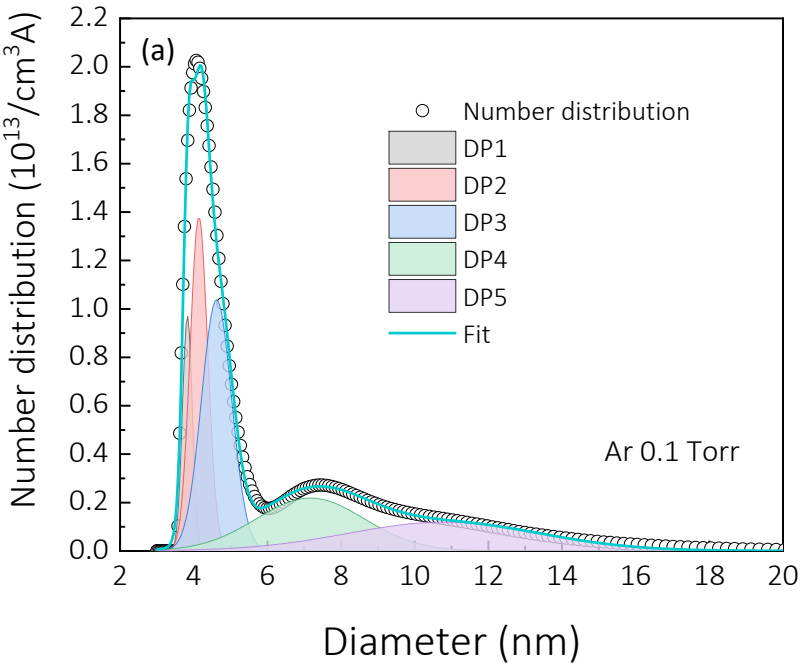
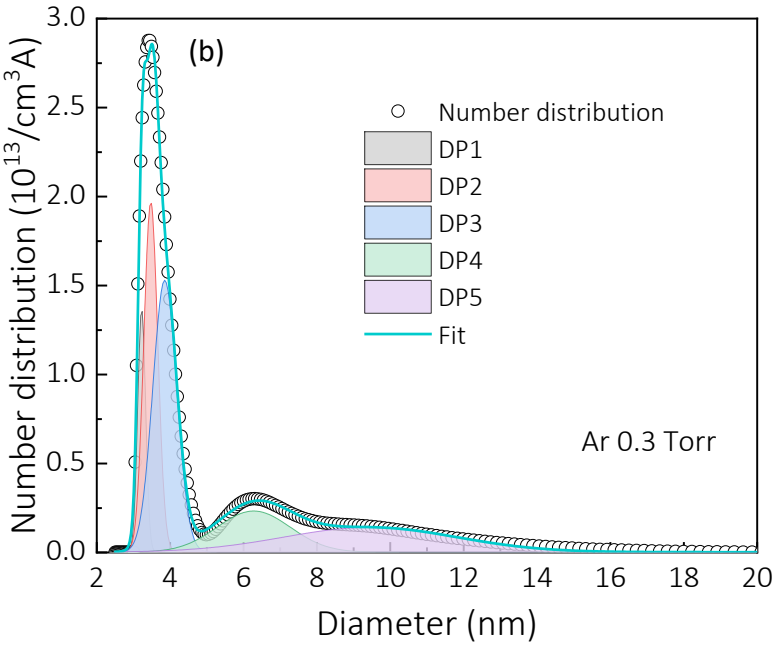


Fig. S4. The deconvolution of the number distribution of the treated sample by O_2 plasma. (a) 0.1 Torr, (b) 0.3 Torr, and (c) 0.6 Torr.


(a)
Number distribution
DP1
DP2
DP3
DP4
DP5
Fit
Ar 0.1 Torr
Number distribution (10^{13}/cm^{3}A)
Diameter (nm)


(b)
Number distribution
DP1
DP2
DP3
DP4
DP5
Fit
Ar 0.3 Torr
Number distribution (10^{13}/cm^{3}A)
Diameter (nm)

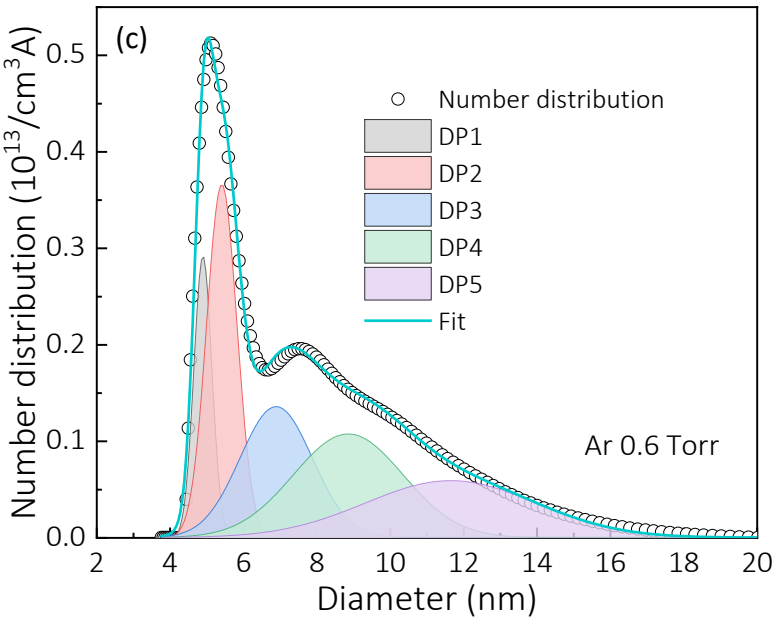


Fig. S5. The deconvolution of the number distribution of the treated sample by Ar plasma. (a) 0.1 Torr, (b) 0.3 Torr, and (c) Ar 0.6 Torr.

Table 2S. Coefficient of determination (R^2) and degree of freedoms (DOFs) related to the deconvolution of the number distributions.

	Pristine	N_2 0.1	N_2 0.3	N_2 0.6	O_2 0.1	O_2 0.3	O_2 0.6	Ar 0.1	Ar 0.3	Ar 0.6
R^2	0.9958	0.9963	0.9985	0.9983	0.9965	0.9987	0.9988	0.9964	0.9965	0.9952
DOF	114	114	144	144	183	140	140	183	155	149