Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Atomic Layer Deposition of Al_2O_3 Process Emissions

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Contents:

1. Instrument setup of size distribution and concentration measurements.

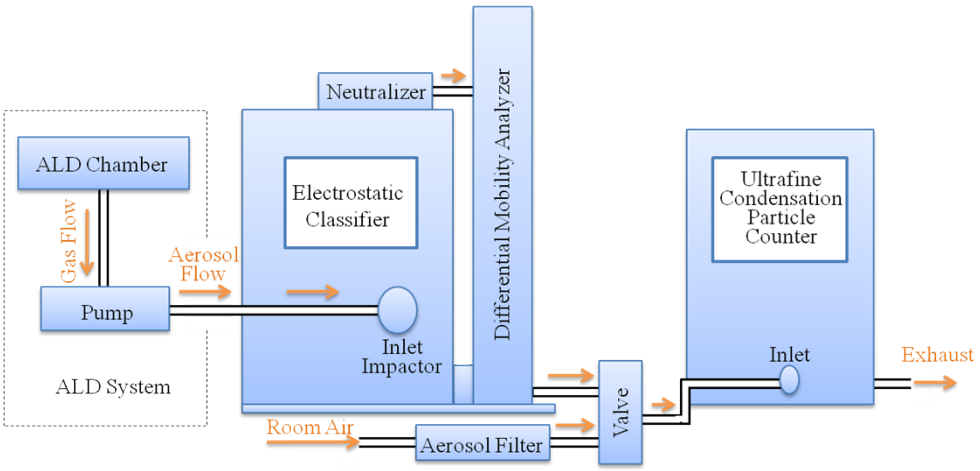

Figure S1. Instrument setup of SMPS.

Figure S1 shows the instrument setup of aerosol size distribution measurement by SMPS. The SMPS is a combination of electrostatic classifier and ultrafine condensation particle counter (UCPC). Aerosols emitted from ALD system are introduced directly into electrostatic classifier without pre-treatment. A neutralizer chamber which provides an equilibrium charge on aerosols is installed inside electrostatic classifier. Differential mobility analyzer (DMA) has an inner electrode connected to negative power supply (0 to -10000V). Therefore, when flowing through DMA, positively charged aerosols are attracted by the wall, meanwhile, negatively charged aerosols are separated according to their electrical mobility, which is related to size of aerosols. In this SMPS setup, aerosols ranging from 10 to 1000 nm are able to be separated. The separated aerosols then continue flowing into UCPC and then concentration of aerosols in different sizes are measured by UCPC.

Electrostatic classifier is removed when measuring aerosol concentration because no size selection is needed and the removal of electrostatic classifier can improve speed of concentration measurement.

Flow rate of N_2 in ALD system is 20 sccm, however, the smallest flow rate allowed in UCPC is 30 sccm. Therefore, filtered room air is introduced into UCPC simultaneously with aerosol sample to provide appropriate flow rate to the system. Concentration of aerosols can be calibrated by ratio of the two types of airstream .

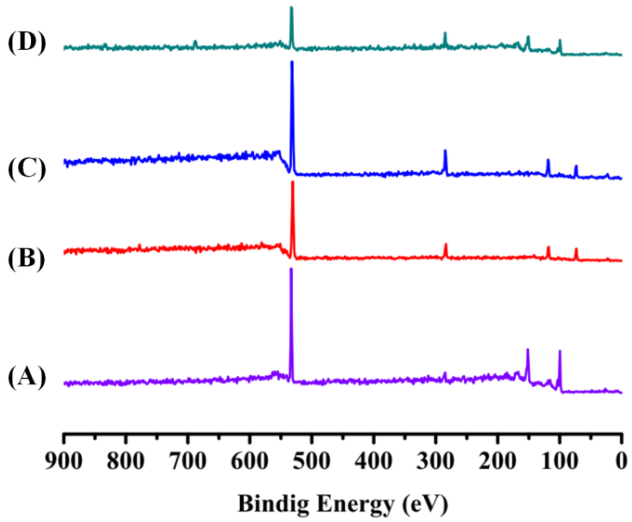

Figure S2. XPS data of the samples collected along ALD system. (A), (B), (C) and (D) are correlated with the four types mentioned in figure 4.

Table S1. Atomic concentrations of the 10 samples analyzed by EDS.

Sample No.	C (atom. %)	Al (atom. %)	O (atom. %)	Si(atom. %)
1	2.75±0.78	2.04±0.20	8.75±1.86	86.46±4.36
2	2.81±0.90	1.74±0.20	7.83±1.90	87.61±4.36
3	6.18±1.94	1.96±0.28	11.73±3.38	80.12±4.36
4	4.99±1.70	1.80±0.22	9.45 ± 2.90	83.77±4.40
5	1.79±0.72	2.28±0.20	9.42±2.20	86.50±4.36
6	2.03±0.76	2.44±0.22	9.71±2.22	85.82±4.30
7	2.08±0.74	2.47±0.22	9.43±2.16	86.03±4.36
8	3.05±0.88	2.11±0.20	10.98±2.28	83.86±4.28
9	3.51±0.96	2.46±0.22	12.79±2.60	81.24±4.18
10	2.86±0.88	-	3.00±1.04	94.14±4.56