Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting information for 'Converting Molecular Layer Deposited alucone films into Al_2O_3/alucone inorganic/hybrid multilayers by plasma densification.'

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SUPPORTING INFORMATION

LIST OF FIGURES

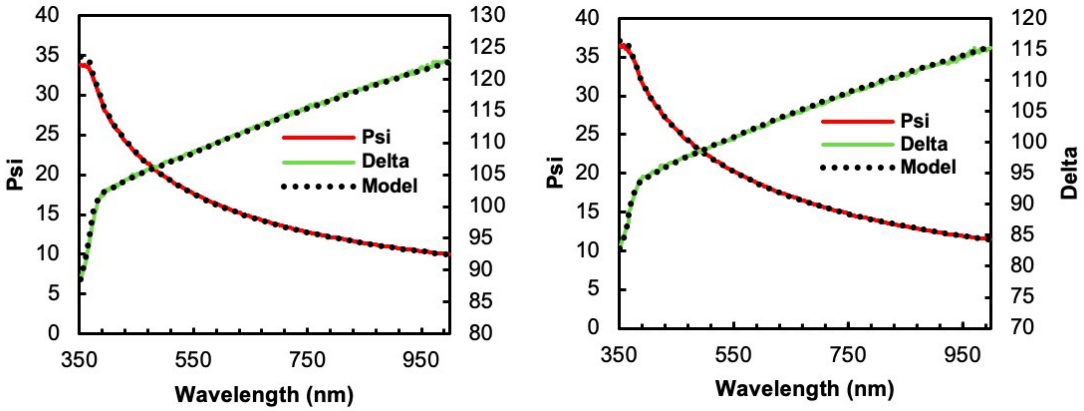

Figure S1. Raw psi/delta ellipsometry data of first (a) and last point (b) of an example (Figure 1) O_2 plasma densification process.

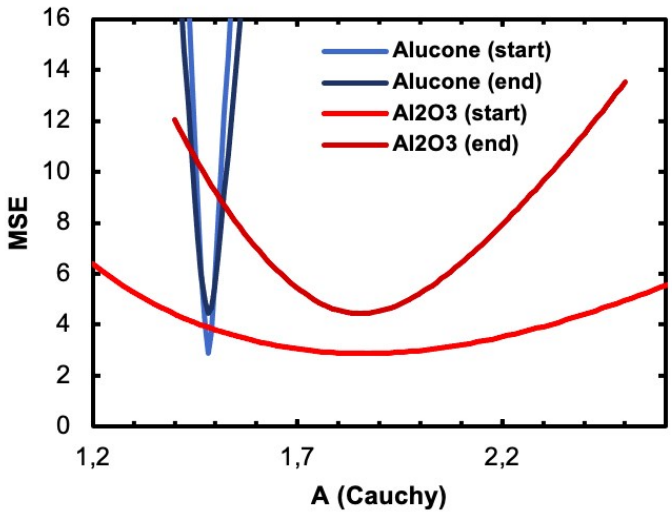

Figure S2. Ellipsometry error variation with respect to changing alucone/Al_2O_3 refractive indexes.

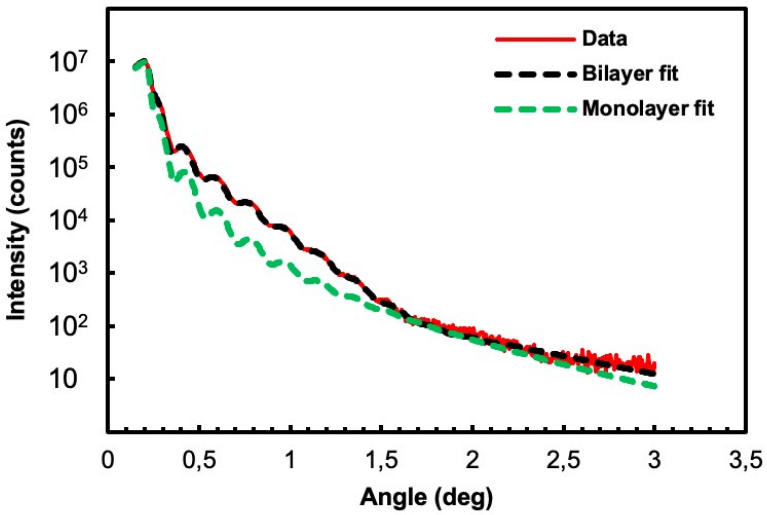

Figure S3. X-ray reflectivity data of a sample after densification, fitted with a monolayer model (green) and a bilayer model (black).

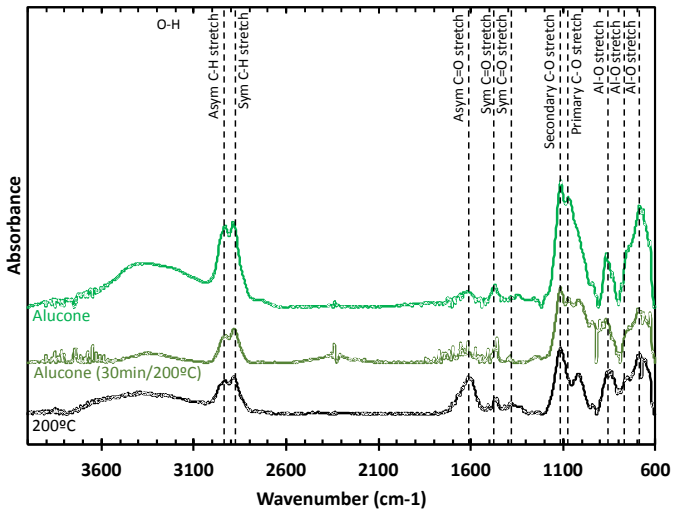

Figure S4. FTIR comparison between a pristine alucone, an alucone deposited and left for 30 minutes inside the reactor chamber at 200ºC; and an alucone densified at 200ºC.

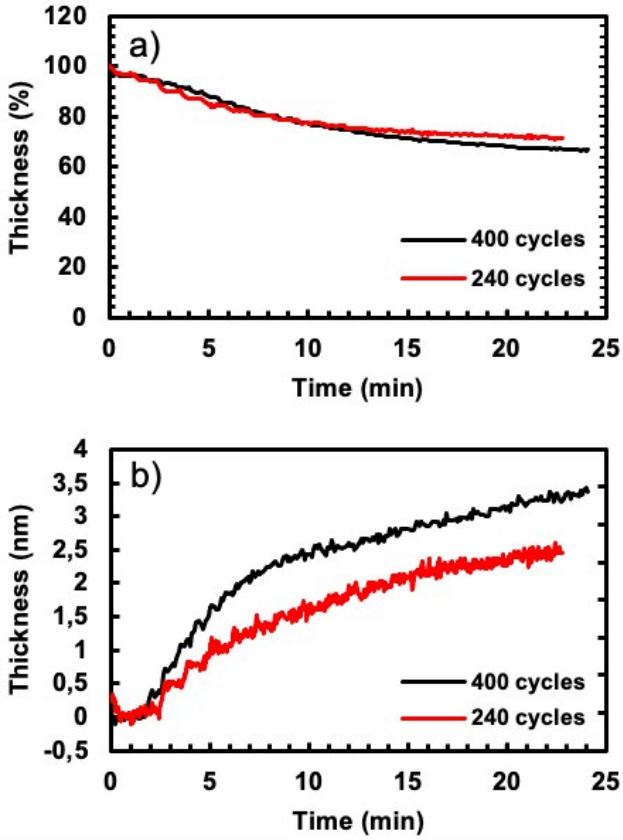

Figure S5. a) Alucone removal in percentage (%) of original film remaining at different thickness levels. b) Al_2O_3 formation in nm with plasma exposure time (normalized).

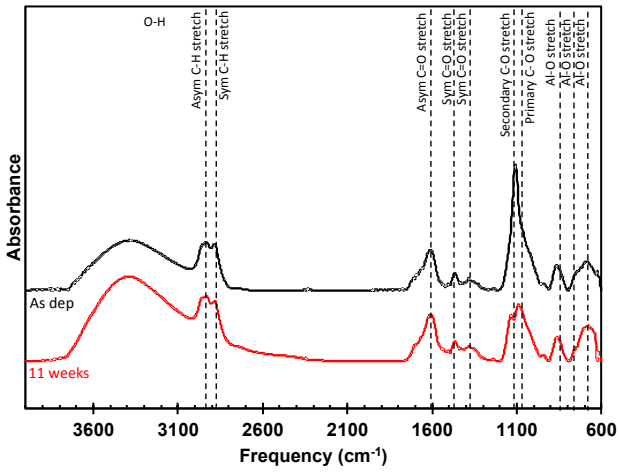

Figure S6. FTIR comparison of an alucone/Al_2O_3 multistack as-deposited (black) and after aging in air for 11 weeks (red).

XRR TABLES

Table S1. Thickness values of alucone/Al_2O_3 pre- and post-densification, densified at different temperatures. Data was collected by SE (top) and XRR (bottom).				
Film	**Technique used**	**50ºC**	**100ºC**	**200ºC**
Original alucone thickness (nm)	SE	25.27	31.25	30.09
Alucone thickness after densification (nm)	SE	17.41	22.33	14.96
Al_2O_3 thickness after densification (nm)	SE	2.70	2.63	2.4
Alucone/Original thickness ratio		0.69	0.71	0.50
Original alucone thickness (nm)	SE	25.27	31.25	30.09
Alucone thickness after densification (nm)	XRR	17.77	21.11	21.82
Al_2O_3 thickness after densification (nm)	XRR	2.37	2.18	2.78
Alucone/Original thickness ratio		0.70	0.68	0.73

Table S2. Thickness values of alucone/Al_2O_3 pre- and post-densification, densified at different plasma power settings. Data was collected by SE (top) and XRR (bottom).			
Film	**Technique used**	**140W**	**75W**
Original alucone thickness (nm)	SE	30.94	31.25
Alucone thickness after densification (nm)	SE	21.57	22.33
Al_2O_3 thickness after densification (nm)	SE	3.00	2.63
Alucone/Original thickness ratio		0.70	0.71
Original alucone thickness (nm)	SE	30.94	31.25
Alucone thickness after densification (nm)	XRR	20.78	21.11
Al_2O_3 thickness after densification (nm)	XRR	1.92	2.18
Alucone/Original thickness ratio		0.67	0.68

Table S3. Thickness values of alucone/Al_2O_3 pre- and post-densification, densified at different thickness levels. Data was collected by SE (top) and XRR (bottom).			
Film	**Technique used**	**240cyc**	**400cyc**
Original alucone thickness (nm)	SE	31.25	44.42
Alucone thickness after densification (nm)	SE	22.33	29.61
Al_2O_3 thickness after densification (nm)	SE	2.63	3.01
Alucone/Original thickness ratio		0.71	0.67
Original alucone thickness (nm)	SE	31.25	44.42
Alucone thickness after densification (nm)	XRR	21.11	28.71
Al_2O_3 thickness after densification (nm)	XRR	2.18	2.74
Alucone/Original thickness ratio		0.68	0.65