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Supplementary Information

High-quality SiN_x Thin Film Growth at 300 °C Using Atomic Layer Deposition with Hollow Cathode Plasma

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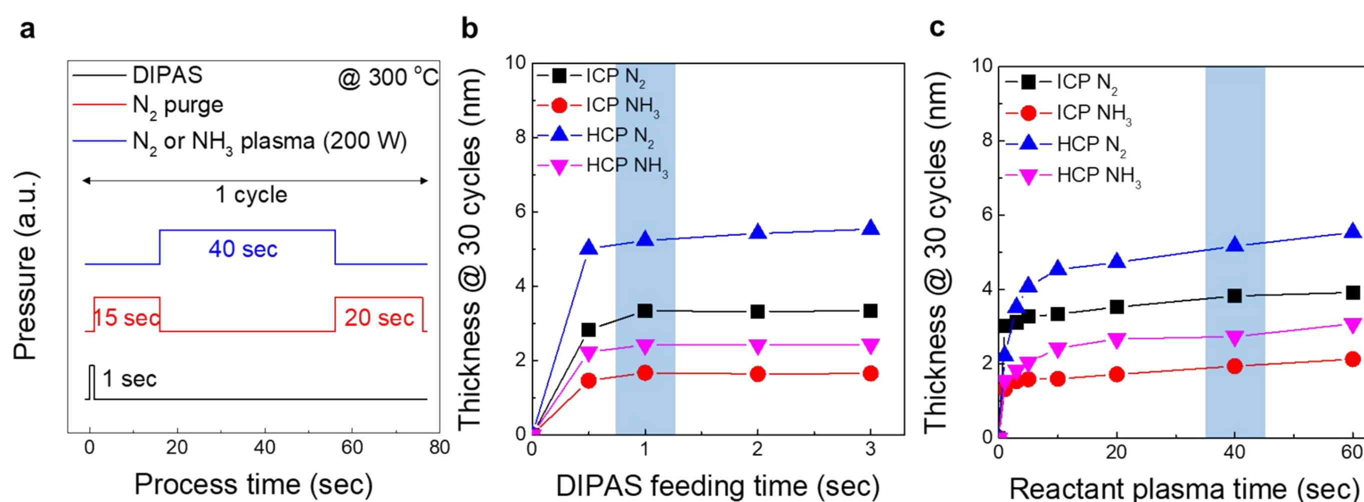


Fig. S1 (a) ALD process recipe for the SiN_x film using DIPAS and N_2 or NH_3 HCP. Growth-saturated condition was obtained with (b) DIPAS precursor feeding time of 1 s and (c) plasma pulse time of 40 s.

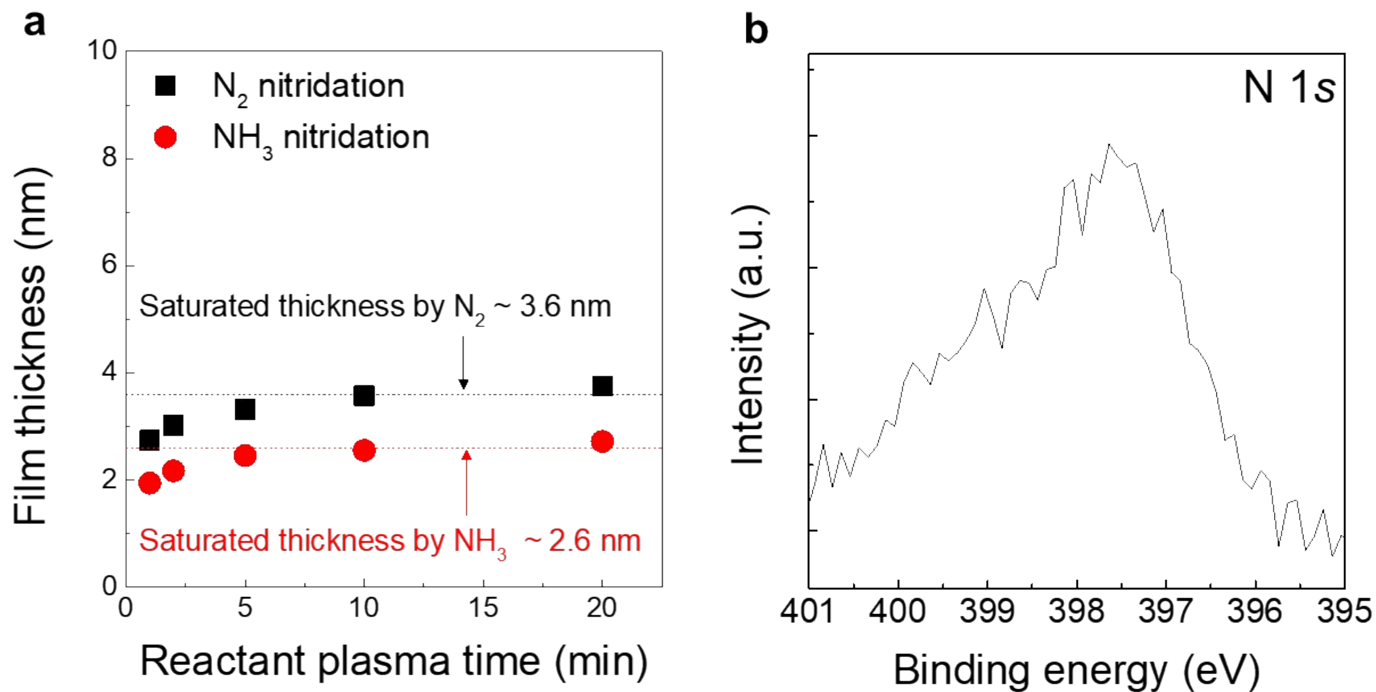


Fig. S2 (a) Change in thickness of the surface nitride layer grown using N_2 or NH_3 HCP on Si substrate as a function of plasma exposure time. (b) N 1*s* core level XPS spectra of the surface nitride layer.

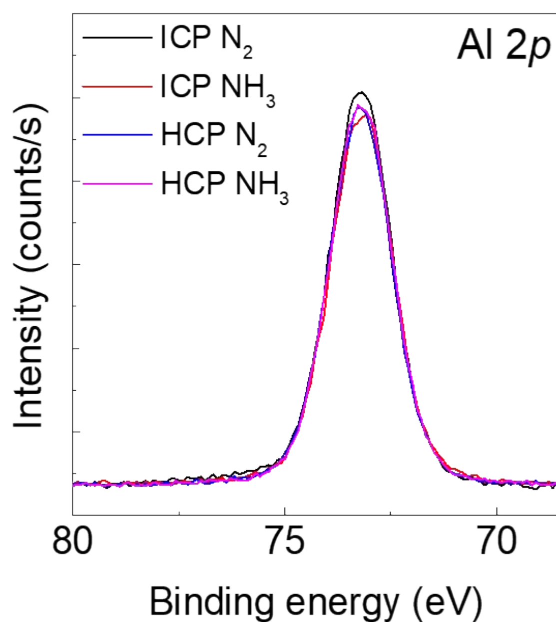
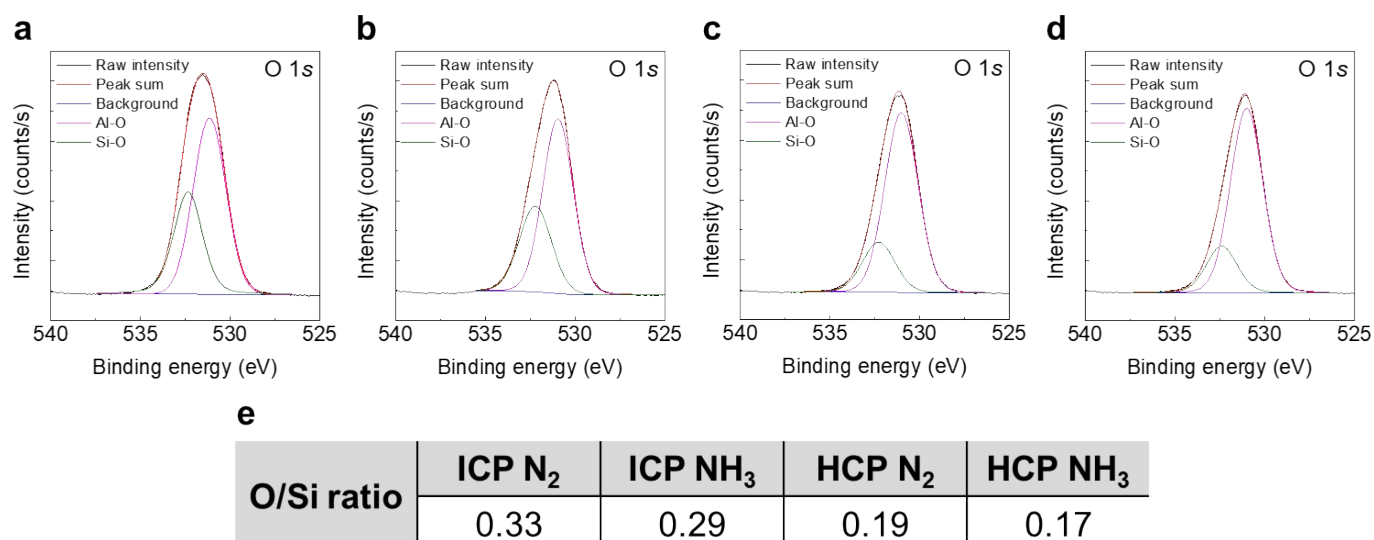


Fig. S3 Al 2*p* core level XPS spectra of all SiN_x films.



O/Si ratio	ICP N_2	ICP NH_3	HCP N_2	HCP NH_3
	0.33	0.29	0.19	0.17

Fig. S4 O 1*s* core level XPS spectra of the SiN_x films grown using (a) ICP N_2, (b) ICP NH_3, (c) HCP N_2 and (d) HCP NH_3 process, respectively. Each deconvoluted spectrum indicates the Al–O or Si–O bonding. (e) The O/Si ratio of the each SiN_x films calculated using the peak areas.