

SI\_5482\_Low-Temperature Atomic Layer Annealing Deposition of Crystallized Gallium Nitride on Oxide-Free Si (111)\_ SeongUk Yun\_UCSD

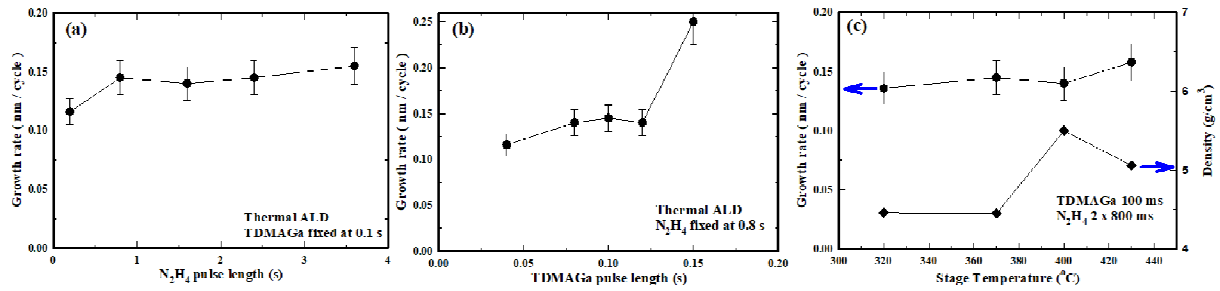


Figure 1. Growth rate per cycle (GPC) as a function of (a) N<sub>2</sub>H<sub>4</sub> pulse length, (b) TDMAGa pulse length, and (c) GPC and density as a function of stage temperature. GPC was saturated at 800 ms of N<sub>2</sub>H<sub>4</sub> and 100 ms of TDMAGa during GaN thermal ALD process.

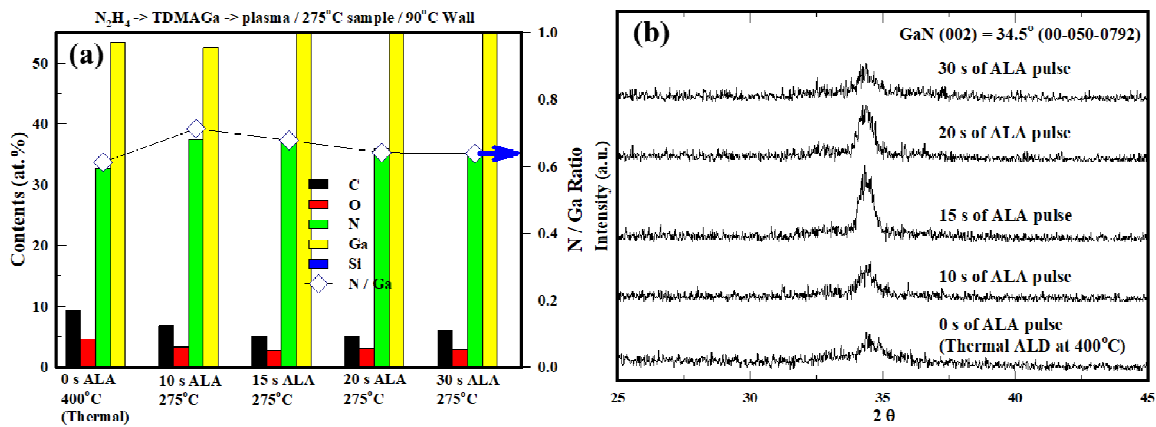


Figure 2. *In-situ* AES and *ex-situ* GI-XRD of *n* s of GaN ALA films. The decreasing oxygen contents were observed in the four ALA processes as compared to the thermal ALD. A distinct XRD pattern of GaN (200) at 34.5° was observed in the GaN ALD thin films regardless of Ar plasma pulse length. It is noted the low N/Ga ratio is an artifact of the Auger sensitivity factors and XPS *ex-situ* XPS confirmed a nearly stoichiometric N/Ga ratio.

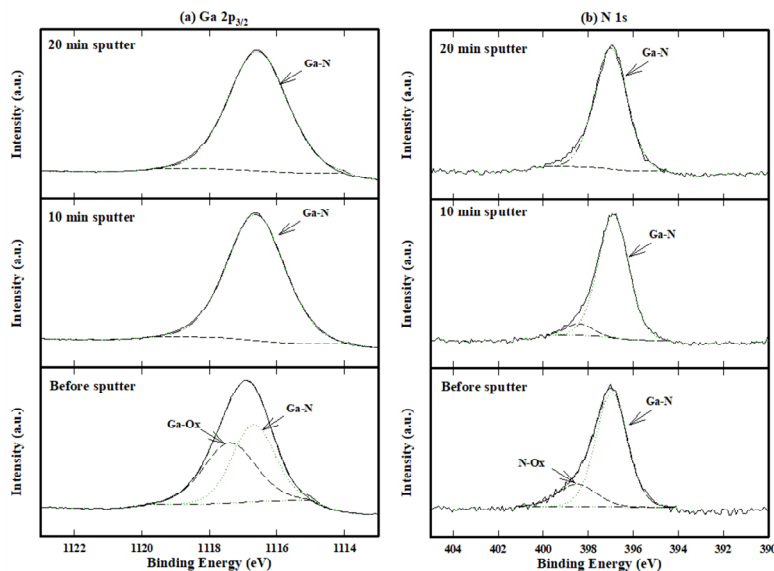


Figure 3. XPS-spectra (a) Ga 2p<sub>3/2</sub> region and (b) N 1s region for 15s GaN ALA film on Si (111) as a function of time of Ar sputtering. Good quality of Ga-N bonds was observed in GaN thin films after Ar sputtering.