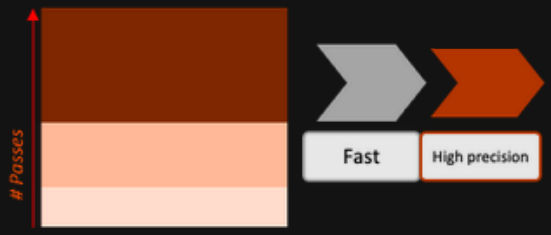
ATLANT 3D®

Ga_2O_3 Thin Film Deposition

- Ga_2O_3 (GaO_x) is an emerging wide-bandgap semiconductor material with significant absorption at wavelengths below 250 nm, near the lower edge of the solar-blind region, as well as a high breakdown field.
- Ga_2O_3 devices are particularly suitable for harsh-environment applications due to their robustness under chemical, radiation, and thermal conditions, with strong potential for solar-blind photodetectors and high-power electronics.
- However, the precise control of film composition and growth conditions to develop stable and stoichiometric Ga_2O_3 is still challenging.



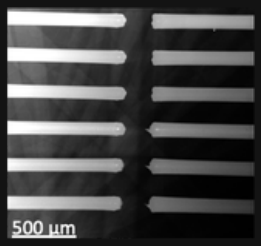


Fig. 1: SEM images of GaO_x deposition lines.

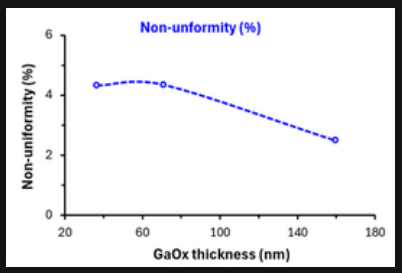


Fig. 2: Ellipsometry thickness measurement and the film's non-uniformity with in below - 5%.

- DALP® enables localized, atom-by-atom patterning and deposition of GaO_x thin films with high atomic precision resource efficient material processing.
- GaO_x film growth shows a gradual decrease in GPP with increasing deposition temperature, consistent with self-limiting surface process of ALD & in agreement with reported GPC in the literature.

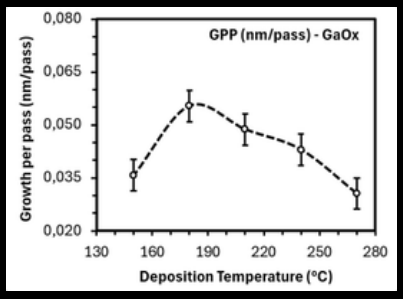


Fig. 3: Growth per pass (GPP) as a function of deposition temperature from 150 to 270 °C line.

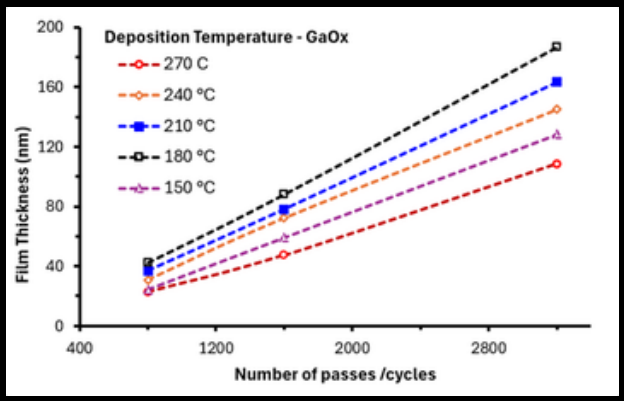


Fig. 4: GaO_x thickness changes with growth temperature of150, 210 - 270 °C at different number of passes/cycles.

PROCESS DEVELOPMENT → GAO_x → ATLANT 3D MATERIALS LIBRARY



ALD condition	ALD Dep. T (°C)	GPC (Å/pass)	Reference
O_3 (Thermal ALD)	200	0,52	Elam & Comstock, Chem. Mater. 24 (2012)
O_2 plasma (PEALD)	200	0,6	Yang et al., Nanomaterials 12 (2022)
H_2O (Thermal ALD)	210	0,5	This work