Film properties / In-situ Ar-annealing Plasma power (W)	Thickness (nm) & Index of refraction MWE-Ellipsometer	Thickness (nm) XRR	Density (g/cm³)	Roughness (nm)
50 (w/o Ar-annealing)	22.69 1.744	20.45	5.24	0.84
50	22.9 1.744	22.78	5.07	0.75
150	23.95 1.767	21.75	5.80	0.89
250	31.39 1.789	28.12	5.62	1.14

Table I. Multi-wavelength ellipsometry (MWE) and x-ray reflection (XRR) extracted thickness, refractive index, density, and roughness of the films grown at 200 °C, 50 W with in-situ Ar-annealing rf-power scanned over 50 – 250 W.

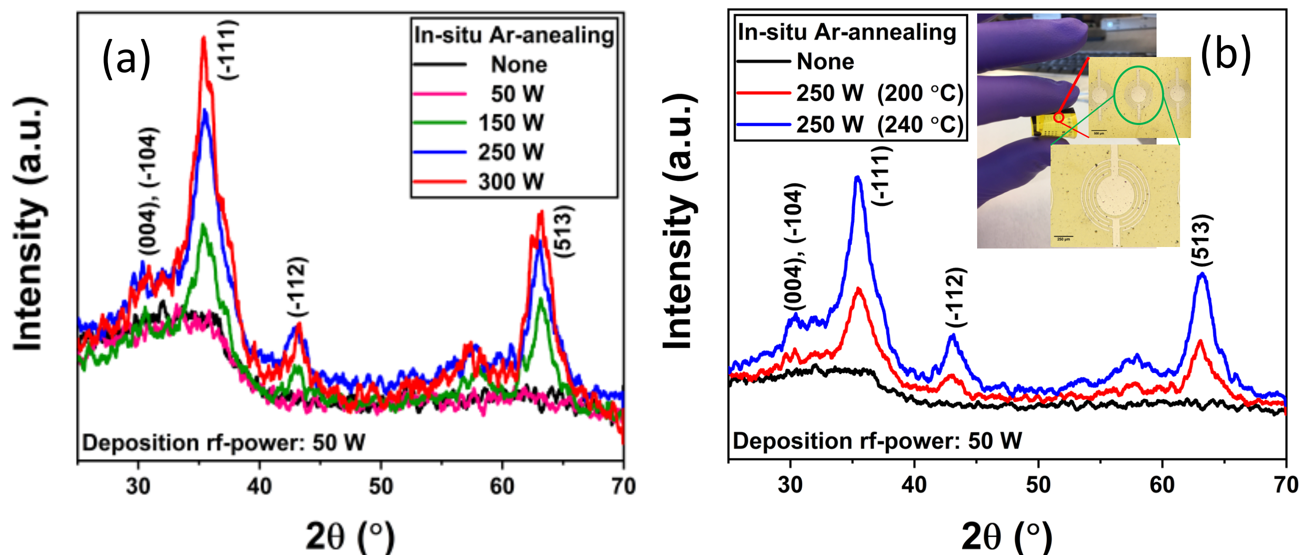

Figure 1. GIXRD spectra of 300-cycle grown β-Ga_2O_3 films at 50 W (a) with varying *in-situ* Ar-annealing plasma powers. (b) at 250 W *in-situ* Ar-annealing power as a function of changing substrate temperature. Inset in (b) shows a proof of concept inter-digitated device structures fabricated by growing Ga_2O_3 as an active layer on Kapton flexible substrate.