SUPPLEMENTAL MATERIAL

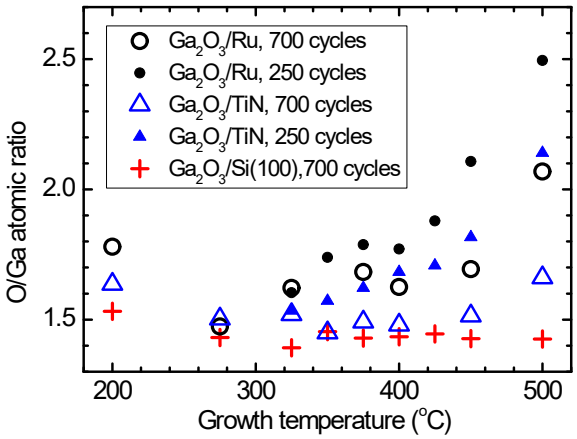

Fig. S1. O/Ga atomic ratios determined by XRF for samples with Ga_2O_3 films deposited at 200–500 °C on uncoated Si(100) and on substrates with Ru and TiN bottom electrodes. The O/Ga atomic ratio depends on the content of these elements in the whole Ga_2O_3/Ru/Si, Ga_2O_3/TiN/Si, and Ga_2O_3/ Si stacks. According to STEM results (Fig. 1), oxidation of Ru and TiN has a marked effect on the O/Ga ratio determined by XRF, particularly, in the case of samples with thinner Ga_2O_3 films.

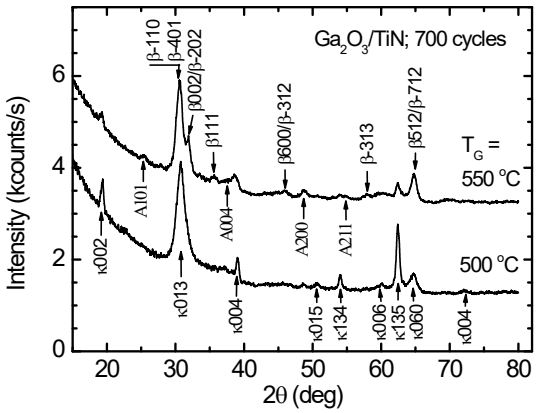

Fig. S2. GIXRD diffractogram of samples with Ga_2O_3 films deposited at 500 and 550 °C on a TiN bottom electrode by using 700 ALD cycles. The growth temperatures and thicknesses of films are shown at corresponding diffractograms. Miller indices of κ-Ga_2O_3 (κ), β-Ga_2O_3 (β), and anatase-phase TiO_2 (A) are shown at respective reflections.

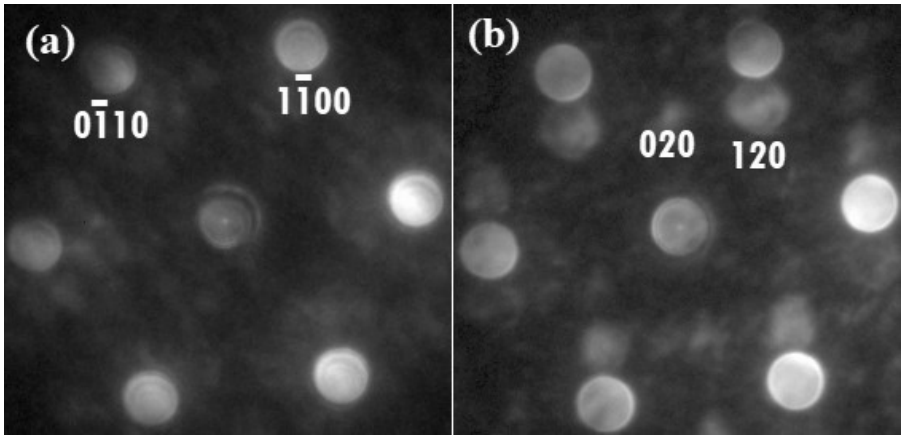

Fig. S3 CBED patterns from (a) ε-Ga_2O_3 (a) and (b) κ-Ga_2O_3.

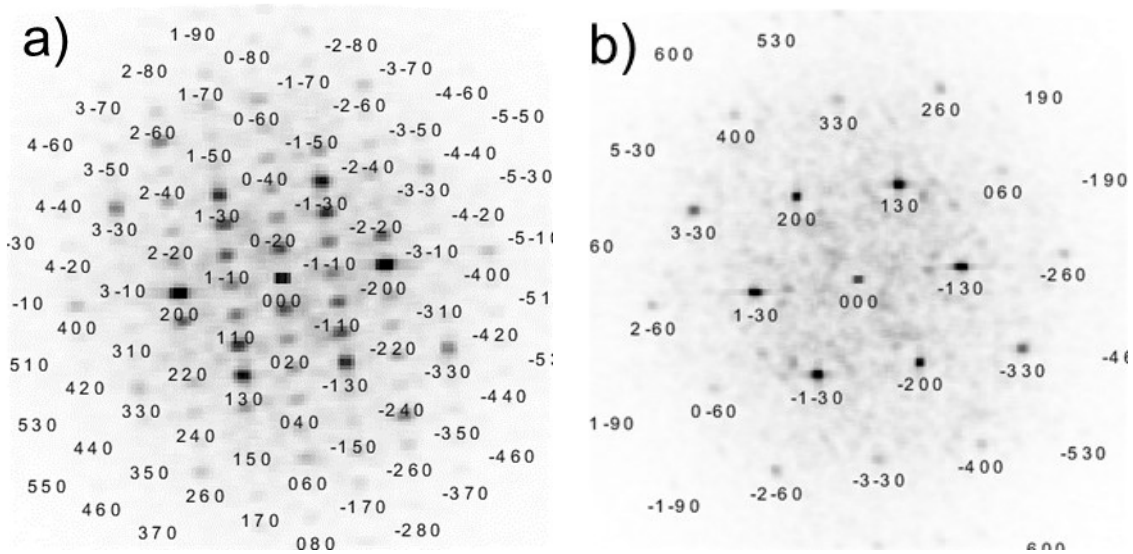

Fig. S4. FFT patterns from (a) ROI 1 and (b) ROI 2 (Fig. 4(a)). The three-index notation was used assuming lattice symmetry of κ-Ga_2O_3

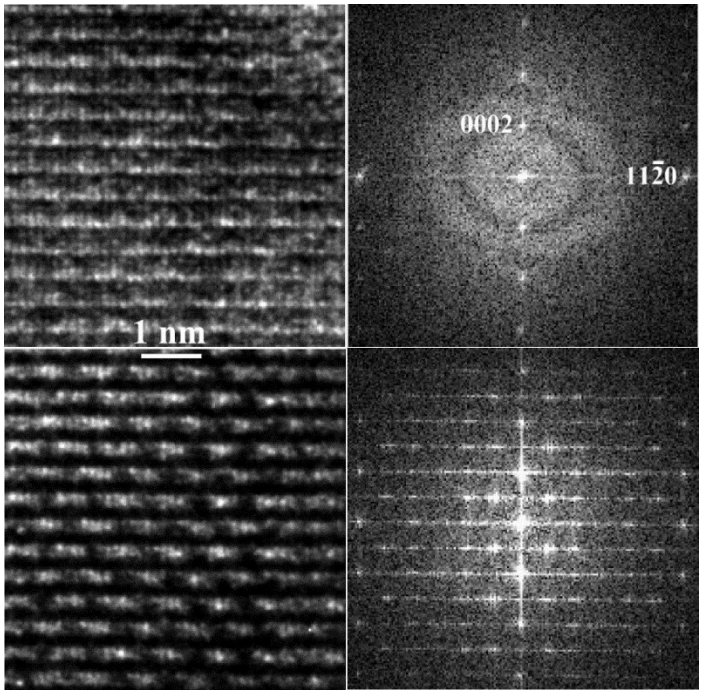

Fig. S5. (a, c) Enlarged high resolution images and (b, d) corresponding FFT from Fig. 4 for (a,b) ε-Ga_2O_3 and (c, d) κ-Ga_2O_3.

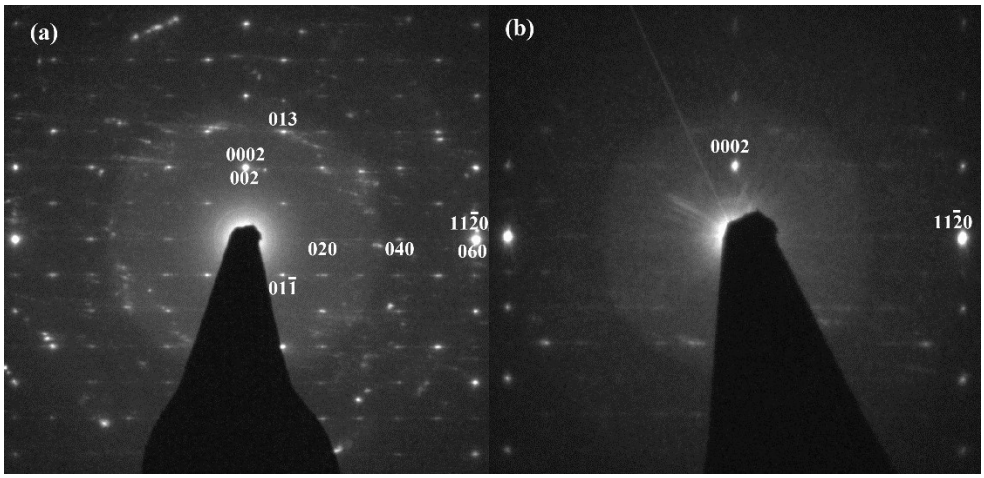

Fig. S6 SAED patterns from (a) κ-Ga_2O_3 and (b) ε -Ga_2O_3. Selected reflections are labelled using four- (ε-Ga_2O_3) or three-index (κ-Ga_2O_3) notations.

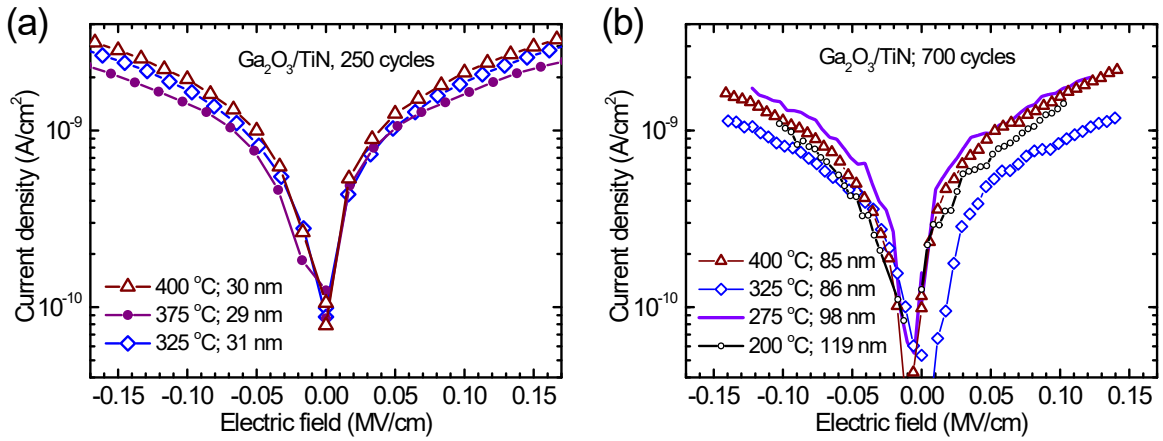

Fig. S7. Current density recorded as a function of electric field strength for Ga_2O_3 films deposited on TiN at different temperatures using (a) 250 and (b) 700 ALD cycles. The deposition temperatures and film thicknesses are depicted in the figure panels.