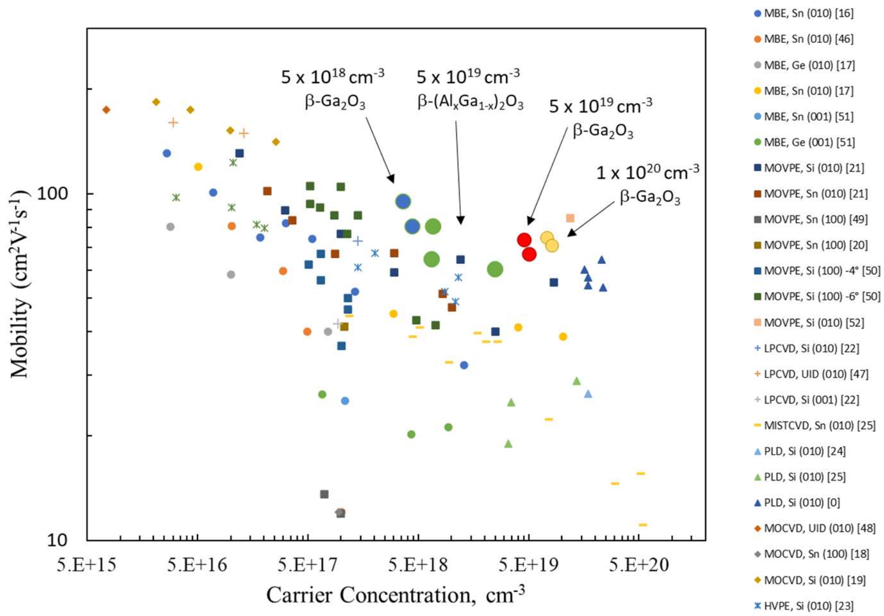

Fig. 1 – Plot of reported mobilities and carrier concentrations for *in-situ* doping methods of β-Ga_2O_3. Results for implant and optimized thermal anneal from this study are shown as blue, red, and yellow dots for MBE β-Ga_2O_3 samples at implant concentrations of $5x10^{18}$, $5x10^{19}$, and $1x10^{20}$ cm^{-3}, respectively, and green dots for MOCVD β-$(Al_xGa_{1-x})_2O_3$ (x=0.09, 0.1, 0.15). Mobilities and carrier concentrations from Si implant with optimized annealing are highly competitive with *in-situ* doping methods, even for AlGO samples.

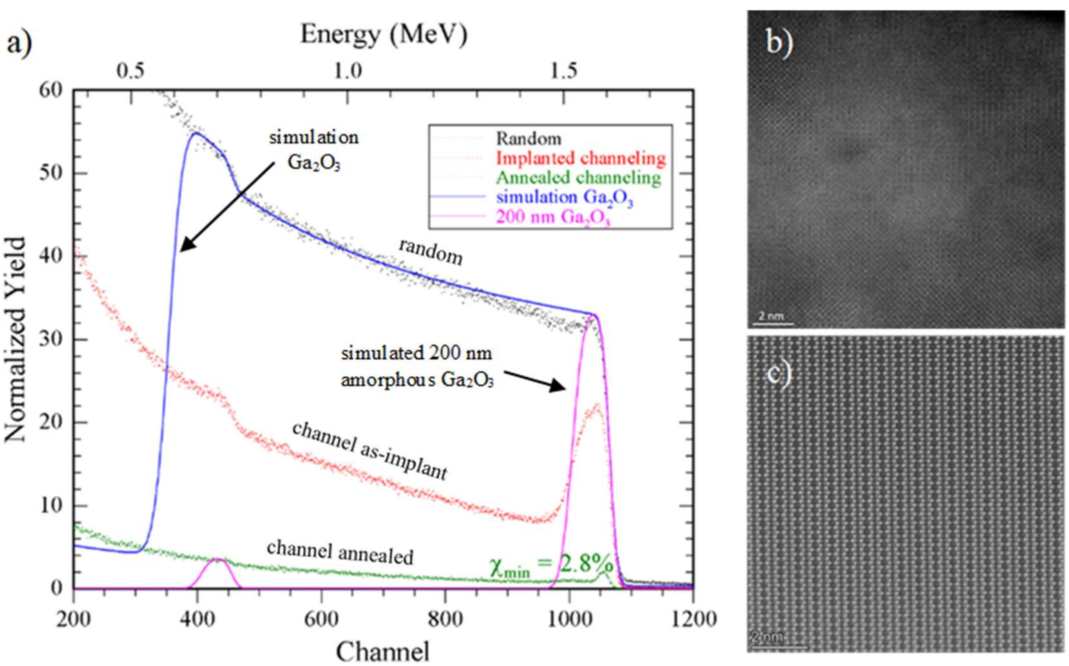

Fig. 2 – (a) RBS/C data showing only partial amorphization of the implant region (red channeling) within the top 200 nm; shown in pink is the expected Ga peak for a fully amorphized 200 nm layer. After annealing, channeling data (green) shows lattice recovery to a near perfect crystal. (b) and (c) show atomic resolution STEM images of the implanted sample showing (b) visible lattice damage and areas of retained crystallinity and (c) fully recovered lattice after annealing at 950 °C for 20 minutes in high purity nitrogen.

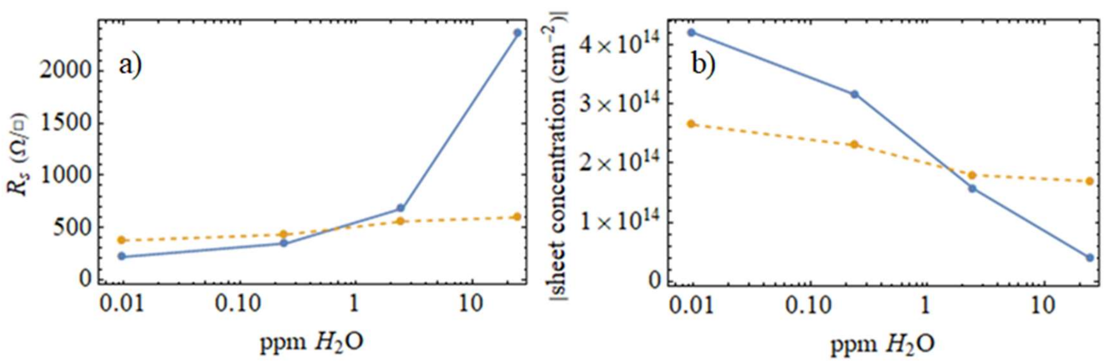

Fig. 3 – Plots of (a) sheet resistance, R_s and (b) carrier concentration (cm^{-3}), for annealing with controlled amounts (0.25, 2.5, and 25 ppm) of H_2O in otherwise ultra-dry, high purity nitrogen. The increase in R_s is associated primarily with a decrease in carrier concentration (blue points). Subsequent annealing (orange points) in dry N_2 shows partial recovery of carrier density and R_s.