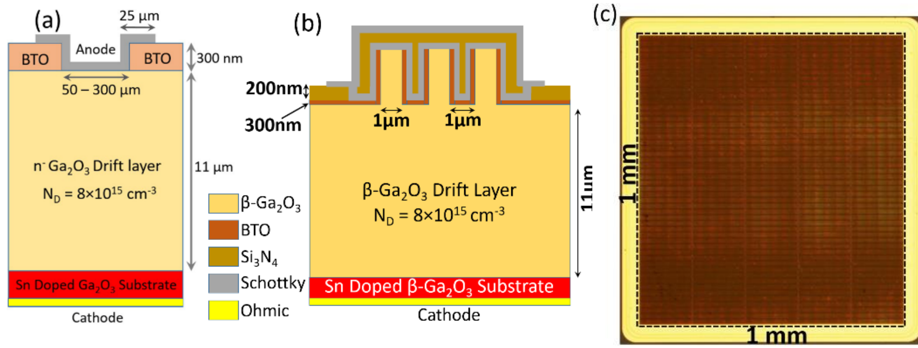


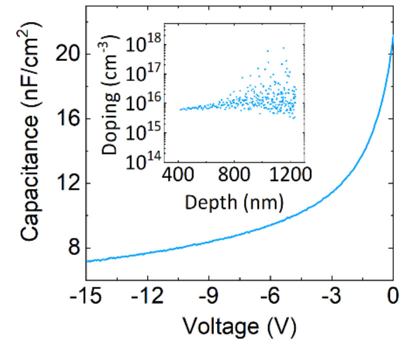
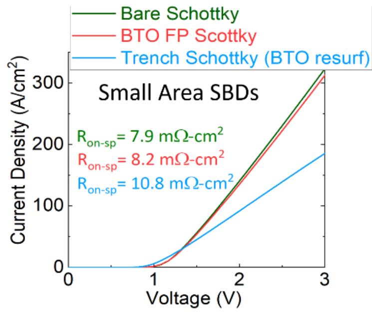
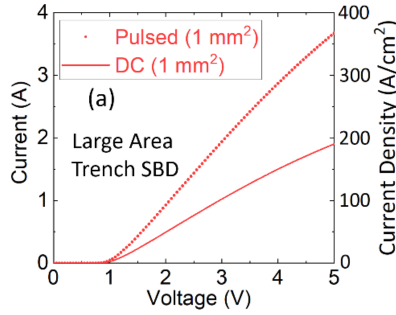


Fig. 1 Schematic diagram of (a) BTO field plated and (b)BTO RESURF trench Ga_2O_3 SBD, (c) Microscope image of the large area ($1mm^2$) SBD.

Fig. 2 CV and doping profile of the HVPE epitaxial layer from a Pt/Ga_2O_3 (Bare Schottky) test structure.





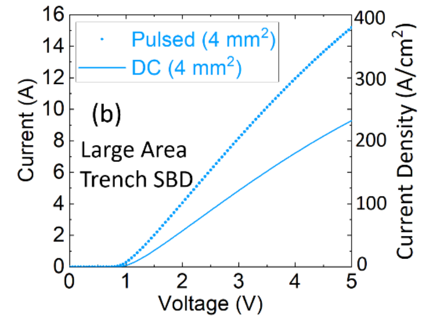
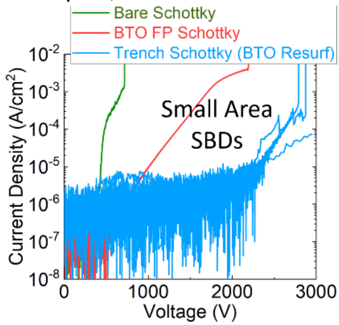
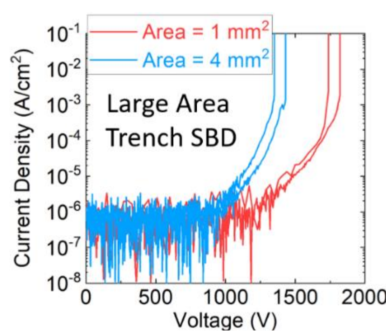


Fig. 3 IV characteristics of three types of SBDs (small area ~ 200x 200 μm^2)

Fig. 4 DC and pulsed IV characteristics of (a) $1mm^2$ and (b) 4 mm^2 large area SBD.





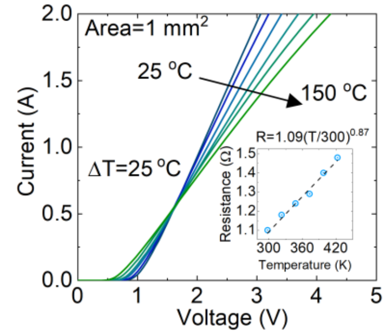


Fig. 5 Reverse IV and breakdown characteristics of the small area SBDs.

Fig. 6 Reverse IV and breakdown characteristics large area trench SBDs.

Fig. 7 Temperature Dependent IV Characteristics. The inset shows temperature dependence of the R_{on} and the power law fitting.

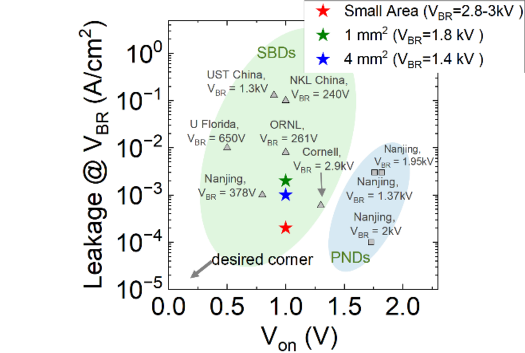


Fig. 8 Benchmark plots showing V_{on} vs $I_{Leakage}$ at breakdown for state-of-the-art β-Ga_2O_3 SBDs

Table I Summary of the performance parameters of high current (> 1 A) β-Ga_2O_3 SBDs

Device Type	Area (mm^2)	Current @ (V_{on} + 2V) (A)	V_{on} (V)	V_{BR} (V)	$R_{on\text{-}sp}$ ($m\Omega\text{-}cm^2$)	$I_{Leakage}$@V_{Br} (A/cm^2)
Normal SBD (U Florida) JVST. A 39, 013406 (2021).	115	45	0.7	240	-----	-----
FP SBD (Virginia Tech) IEEE Trans. Power Electron. 36, 8565 (2021).	9	20	0.8	700	6.75	-----
NiO JTE SBD (UST China) IEDM. 2022, 210 (2022).	0.78	3	0.9	1300	4.7	0.13
FP JBS (NKL China) IEEE Trans. Power Electron. 36, 6179 (2020).	1	1.7	1	700	7.6	0.005
This Work	**1**	**1 (DC) 2 (Pulsed)**	**1**	**~ 1800**	**~ 10.6**	**0.001**
This Work	**4**	**5 (DC) 9 (Pulsed)**	**1**	**~ 1400**	**~ 10.6**	**0.002**