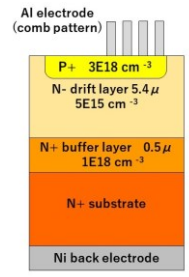
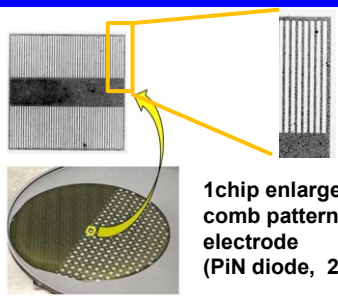
Passion for Truth ITES

Quantification of correlation between forward bias and UV irradiation

Sample Preparation



PiN diode X-section



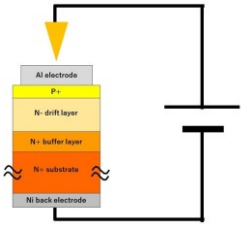
1chip enlarged with comb patterned electrode (PiN diode, 2mm sq.)

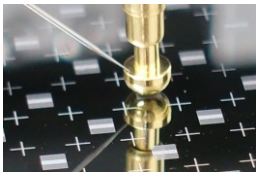
4inch SiC wafer Si-face 4° off

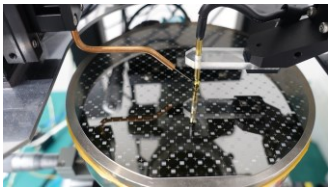
The key indicator bridging forward bias and UV irradiation is the excess minority carrier (hole) density Δp, near the BPD-to-TED conversion point(i/n+ interface in PiN diode). The expansion of a TED-converted BPD depends on whether the hole density near the conversion point exceeds a certain threshold or not [1].

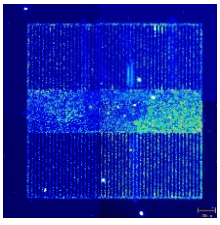
[1] T. Tawara, et al., J. Appl. Phys. 123, 025707 (2018).

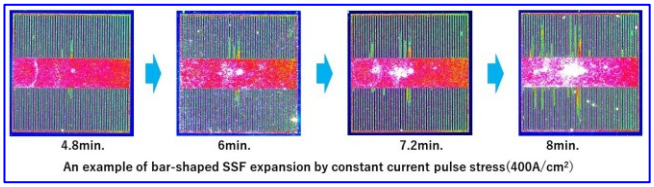
Forward Bias Stress Test









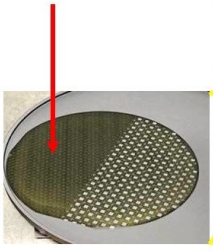


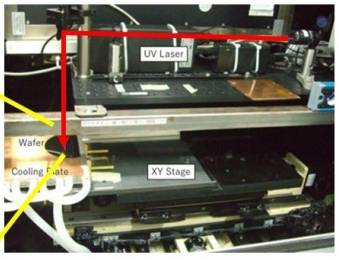
An example of bar-shaped SSF expansion by constant current pulse stress(400A/cm²)

UV Irradiation Test

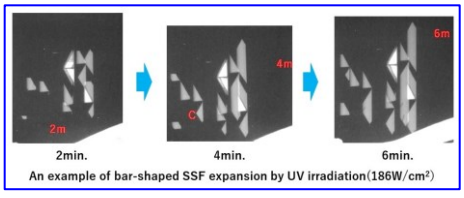
Nd:YAG-3HG pulsed laser

Wavelength = 355 nm **Pulse width = 10 ns**
Beam size = 3 mmΦ **Frequency = 50kHz**



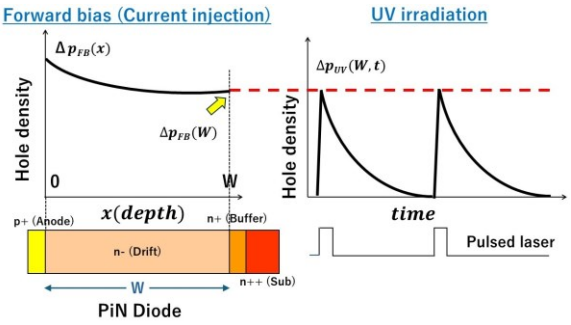


Laser irradiation system

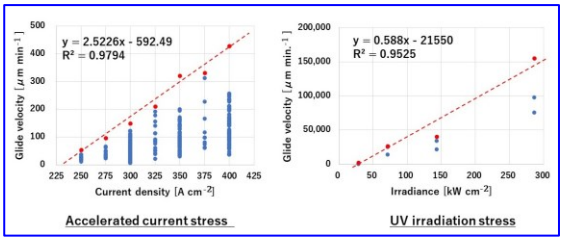


An example of bar-shaped SSF expansion by UV irradiation(186W/cm²)

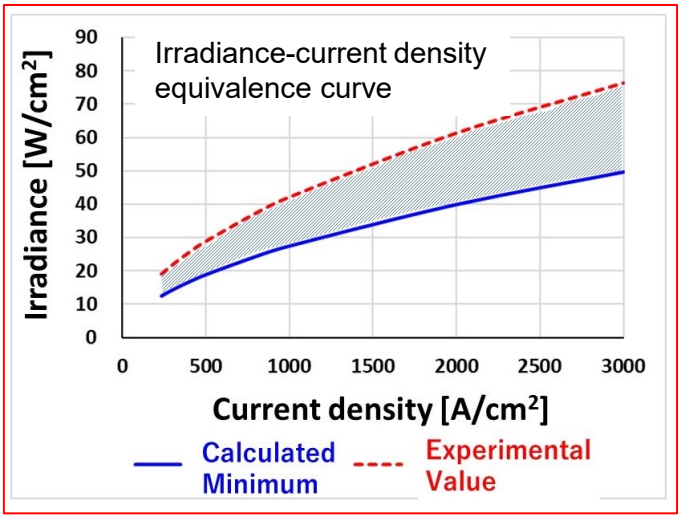
Correlation Between Forward Bias and UV



UV irradiance is so set that the peak value of hole density by UV irradiation (t=0) is equal to the hole density at the i/n+ interface in forward bias operation



Si(g) core glide velocity collection data



Correlation Equation

$$\Delta p_{FB}(W) = \beta \cdot \Delta p_{UV}(W, 0) \quad , \qquad \beta \leq 1.$$