

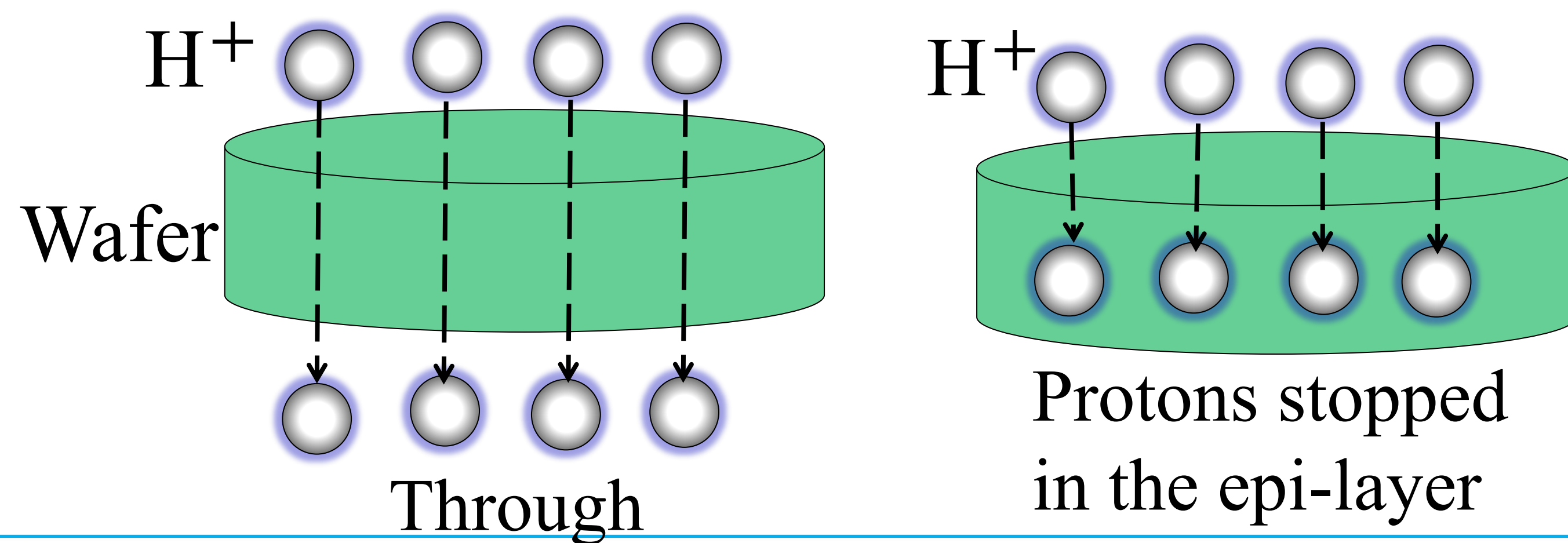


Contrasting Effects of Stopped and Through-Wafer Proton Implantation on Shockley Stacking-Fault Expansion in 4H-SiC

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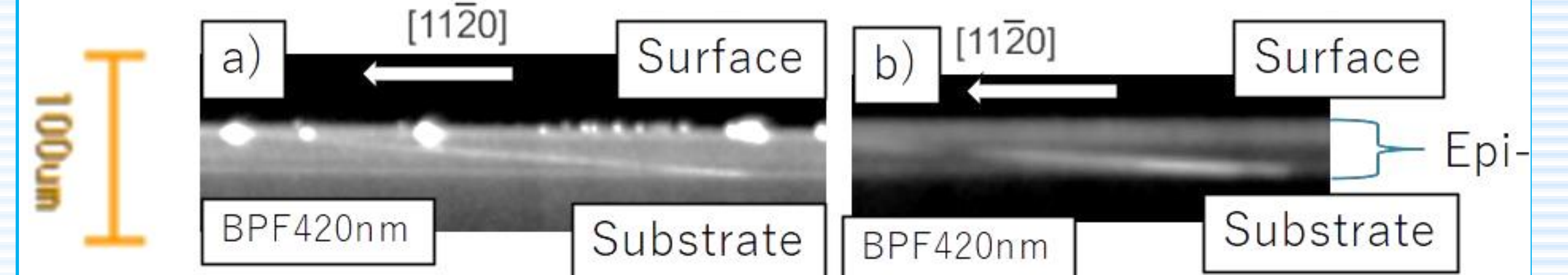
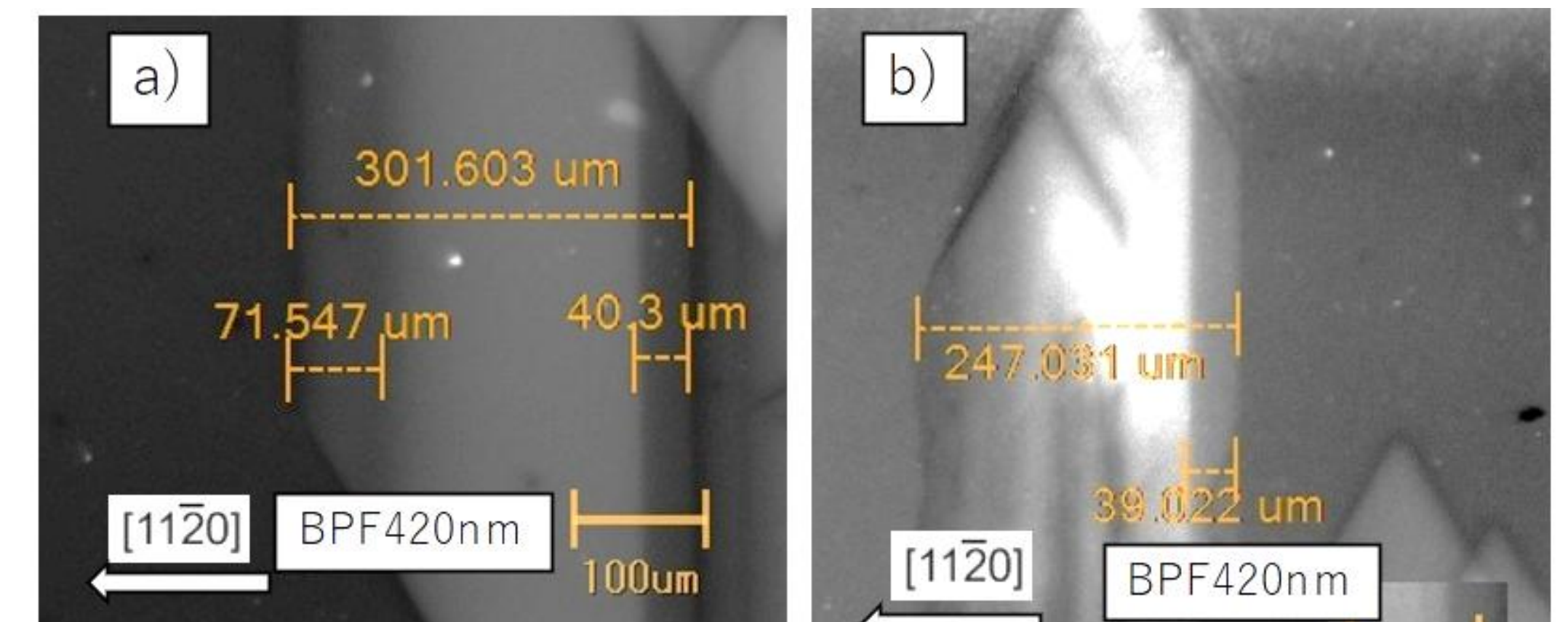
IDEA

SSFs can be suppressed by passing protons through the wafer without stopping them in the epitaxial layer.



Unimplanted

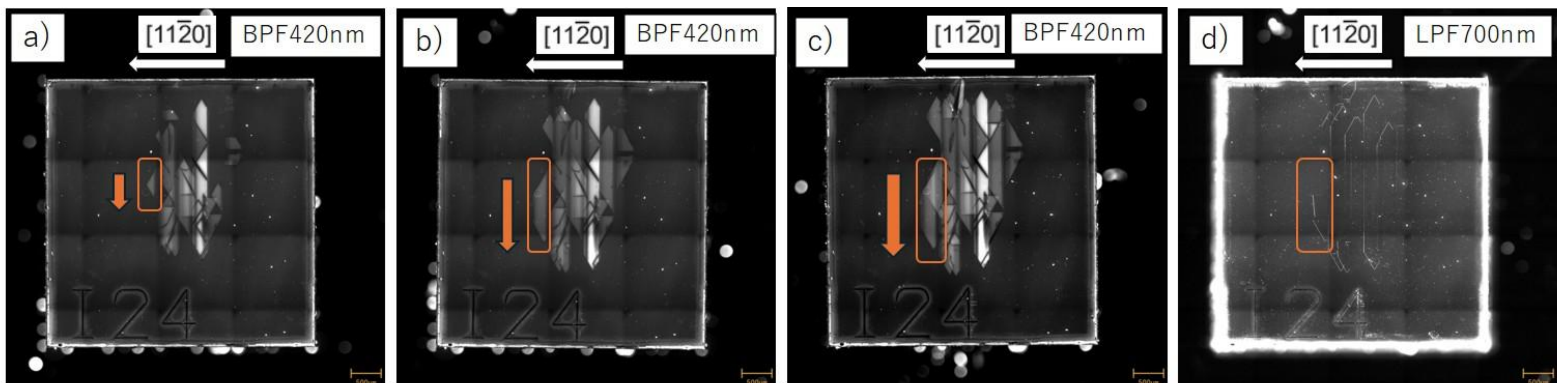
Implanted



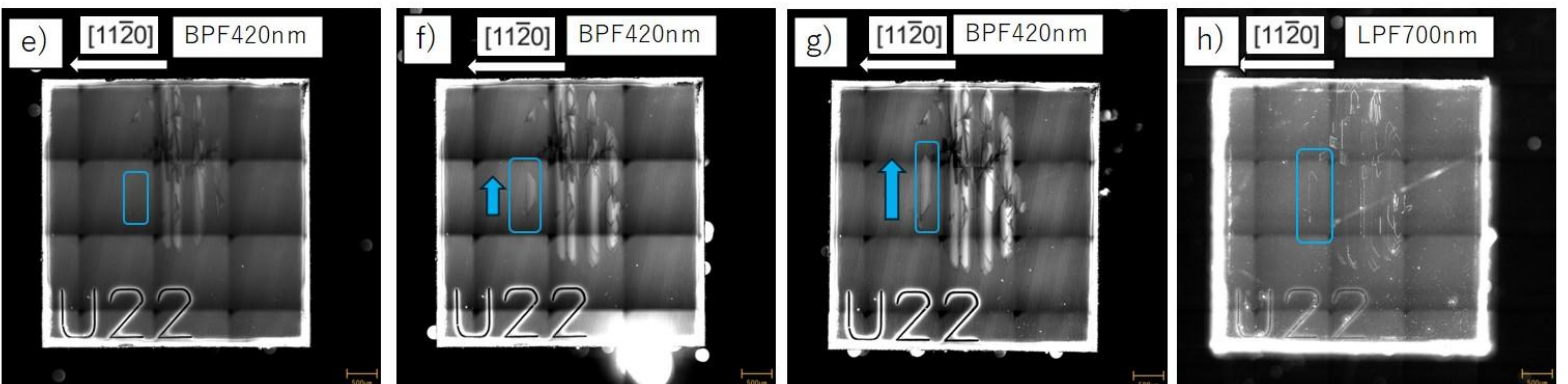
Problem

Proton implantation has two competing effects:
SSF suppression and formation of new nucleation sites.

Unimplanted



Implanted

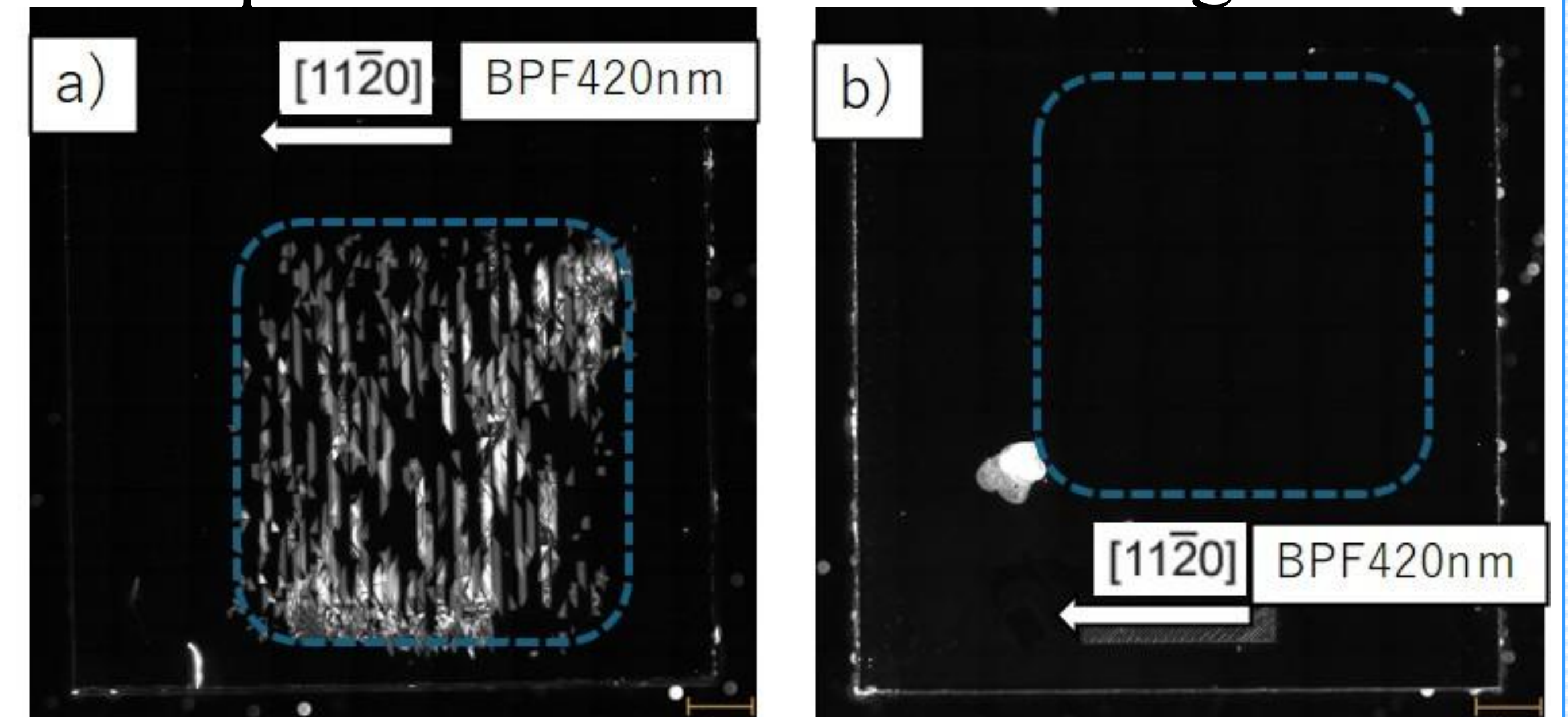


Experiment and Result

Parameter	Condition
Sample	4H-SiC, Epi-thickness 11 μm
Proton Irradiation	17 MeV, 1 × 10 ¹⁴ cm ⁻² , C-face
Annealing	1700 °C, 30 min
UV excitation	355 nm
Scan Area	5 x 5 mm
Scan Condition	15 μm pitch, 1 mm/s, 3 h
Evaluation	UVPL Imaging

Unimplanted

Through



“Through-wafer proton irradiation suppresses SSF expansion, while stopped protons can introduce new nucleation sites.”