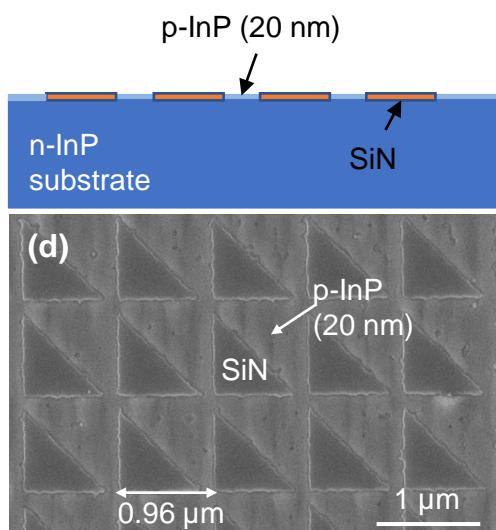
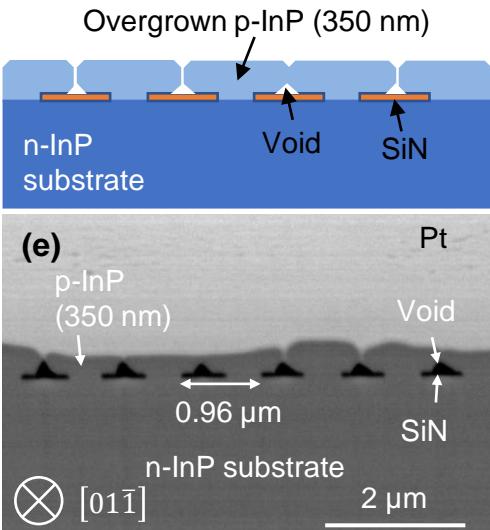


### (a) Initiation of selective growth



### (b) Start of coalescence



### (c) Top surface planarization

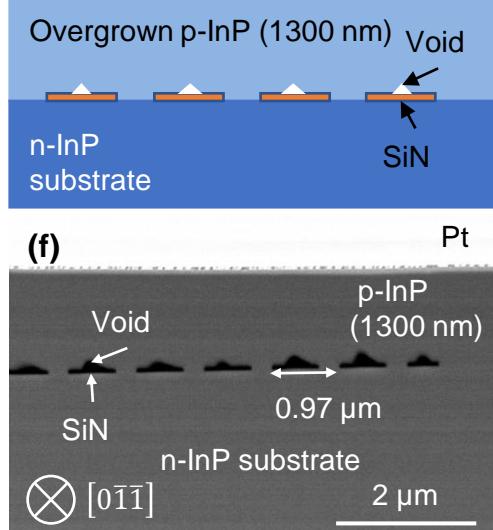
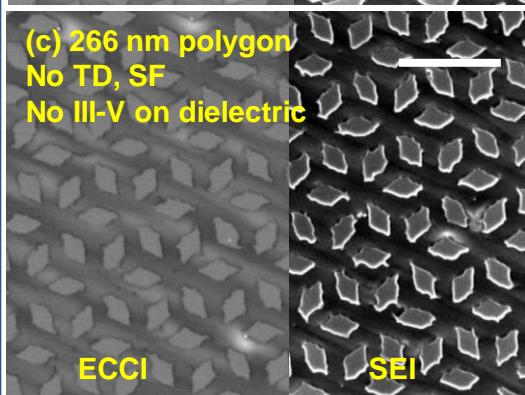
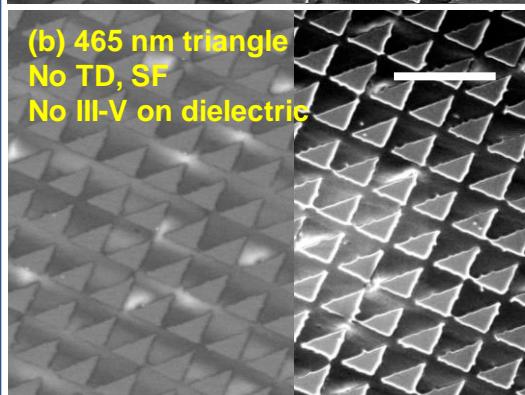
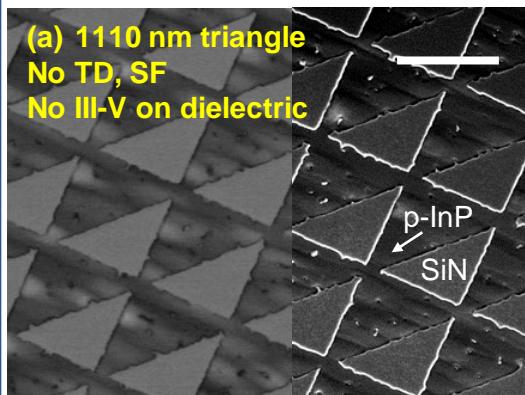
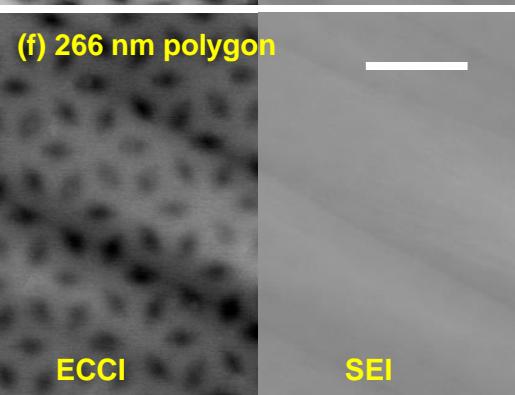
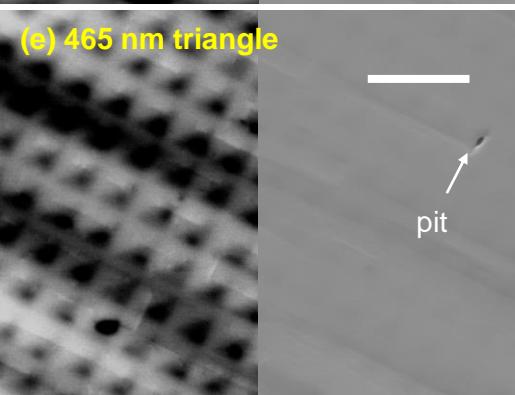
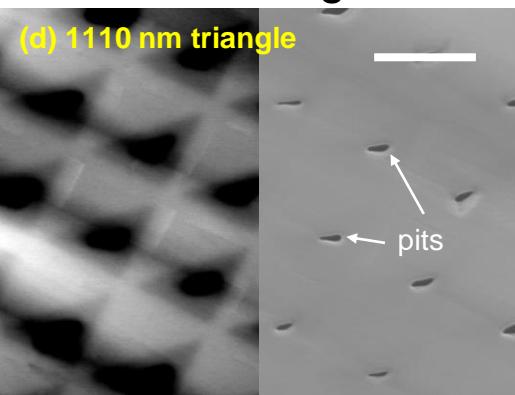


Fig. 1. (a)-(c) Cross-sectional schematics after 20, 350, and 1300 nm of p-InP ( $p=10^{18}\text{cm}^{-3}$ ) growth on patterned n-InP substrate. Pattern consists of isosceles-right-triangles (side length = 965 nm) of SiN (40 nm thick); (d) plan-view SEM after 20 nm growth showing selectivity; (e) and (f) XSEM after 350 and 1300 nm of p-InP growth.

### 20 nm InP growth



### 350 nm InP growth



### 1300 nm InP growth

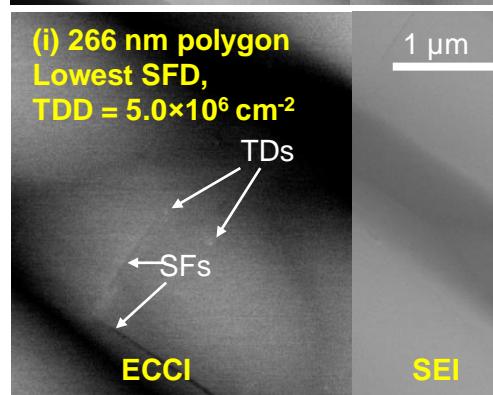
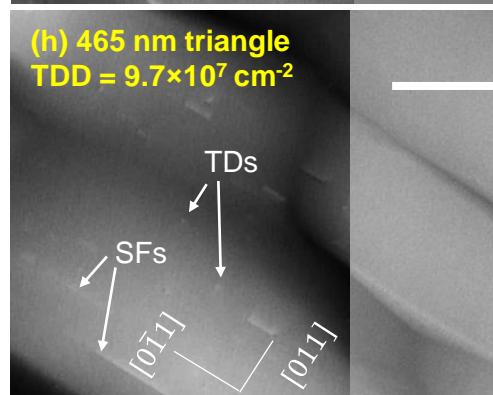
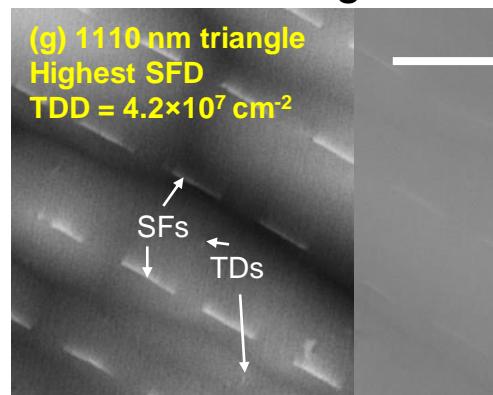


Fig. 2. (a) - (c) ECCI/SEI of 20 nm p-InP grown on patterned SiN/n-InP substrate with feature size of (a) 1110 nm, (b) 465 nm, and (c) 266 nm; (d) - (f) ECCI/SEI of 350 nm p-InP grown on similar patterns; (g) - (i) ECCI/SEI of 1300 nm p-InP grown on similar patterns. SF = Stacking fault, TD = threading dislocation, SFD/TDD refers to density. Scalebar = 1 μm.

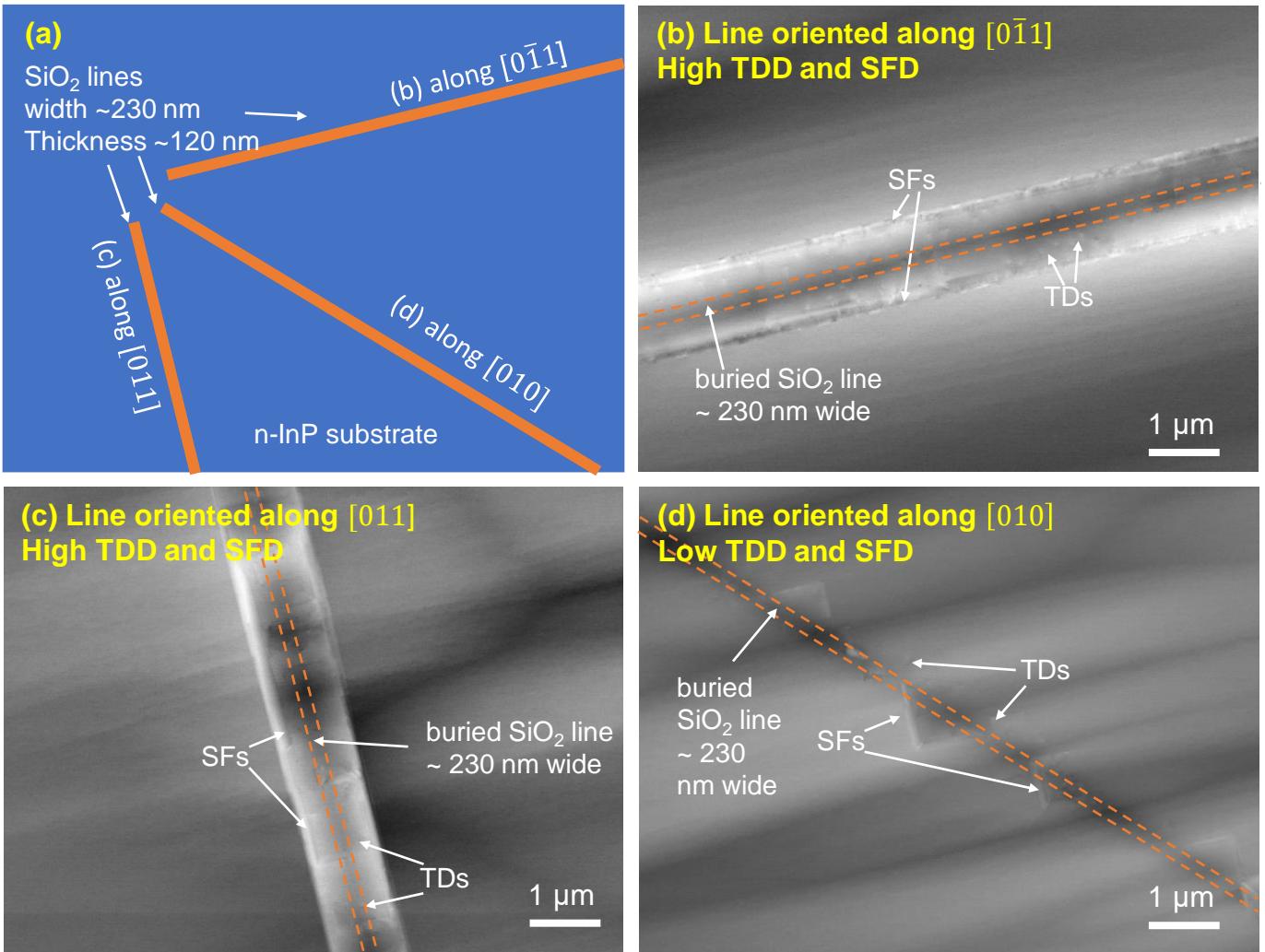


Fig. 3. (a) Plan-view schematics of patterned SiO<sub>2</sub>/n-InP substrate (line pattern); (b) - (d) ECCI of 580 nm p-InP grown on the same substrate with SiO<sub>2</sub> line oriented along (b) [0 -1 1], (c) [0 1 1], and (d) [0 1 0] crystallographic directions. Dashed line represent the two sides of buried SiO<sub>2</sub> lines. The [0 1 0] stripes show the lowest defect density.

## References

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