

## Supplementary Information

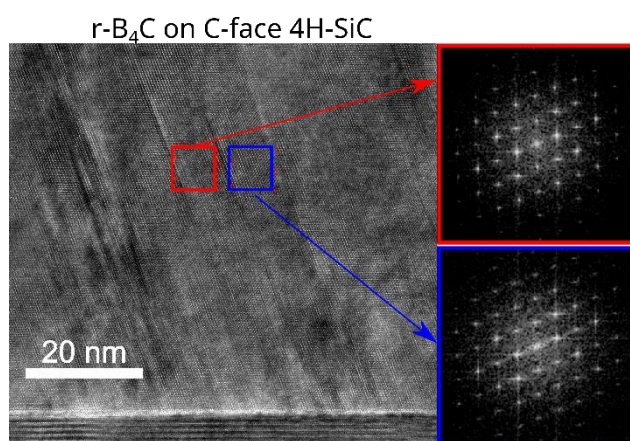
### On the origin of epitaxial rhombohedral-B<sub>4</sub>C growth by CVD on 4H-SiC

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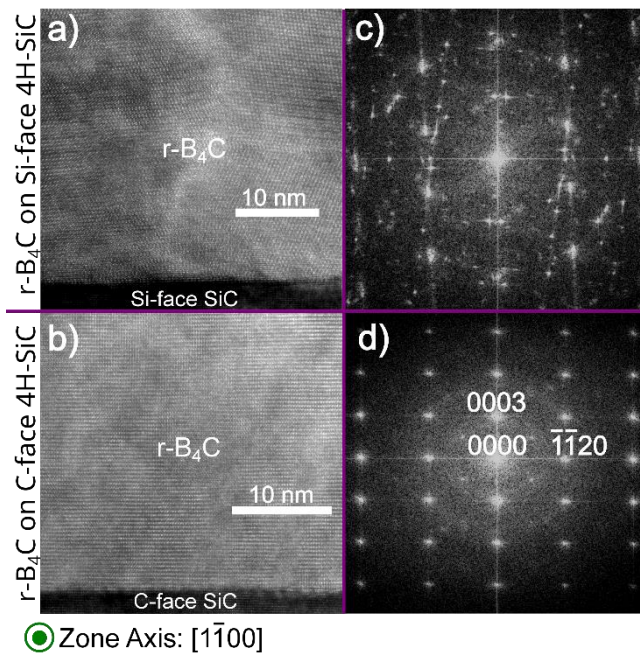
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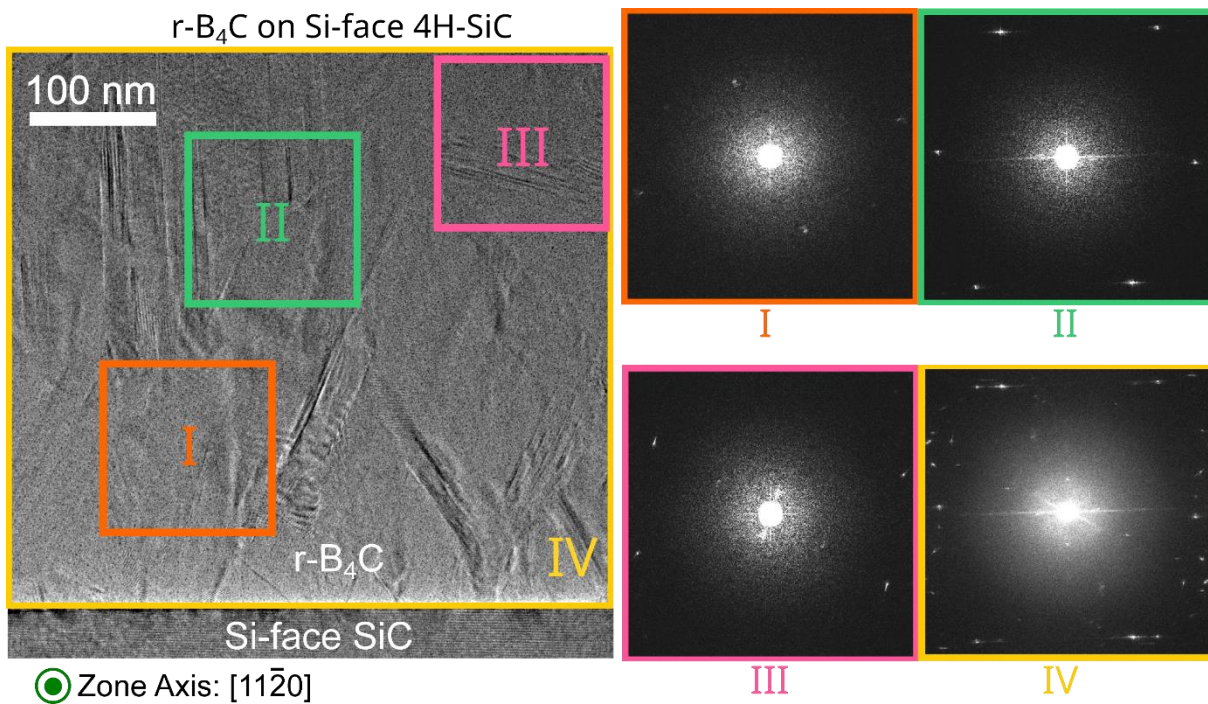


⊙ Zone Axis: [11 $\bar{2}$ 0]

**Figure S1:** Cross-section TEM micrographs and corresponding FFT patterns from either side of the line defect, taken from the r-B<sub>4</sub>C film films grown on C-face 4H-SiC. The 4H-SiC substrates were along the (11 $\bar{2}$ 0) zone axis. The FFT pattern remains the same on either side of the line defects observed.



**Figure S2:** Cross-section TEM micrographs and corresponding FFT patterns, showing  $B_4C$  film-substrate regions from Si-face (a and d) and C-face (b and d) grown films on 4H-SiC. In both cases the 4H-SiC substrates were aligned along the  $(1\bar{1}00)$  zone axis.



**Figure S3:** Cross-section HRTEM micrograph of the  $r-B_4C$  film on Si-face 4H-SiC as observed along the  $(11\bar{2}0)$  zone axis. FFTs of selected areas as well as of the whole micrograph are marked as I-IV on the micrograph. Different  $B_4C$  crystal stacking is observed from FFTs in Regions I, II, and III. Region IV shows the FFT for the whole micrograph which forms a ring from all the different crystal orientations present in the polycrystalline  $r-B_4C$  film.