

Electronic Supplementary Information

***In situ* TEM observation of the vapour-solid-solid growth of $\langle 00\bar{1} \rangle$**

InAs nanowires

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Fig. S1a and S1d shows the bright-field TEM images of typical InAs $\langle 00\bar{1} \rangle$ nanowires. Fig. S1b, S1c, S1e and S1f shows their corresponding HRTEM images and SAED patterns, respectively, indicating that our $\langle 00\bar{1} \rangle$ nanowires have high crystal quality.

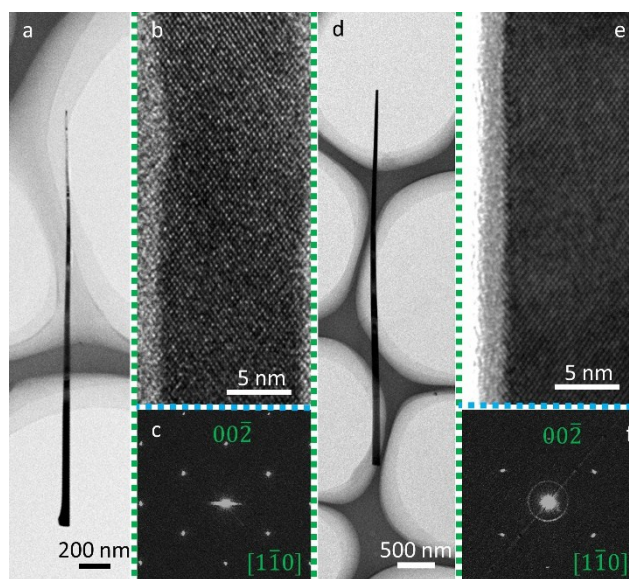


Fig. S1 TEM investigations on typical InAs $\langle 00\bar{1} \rangle$ nanowires. (a, d) BF TEM images of typical InAs $\langle 00\bar{1} \rangle$ nanowires. (b, e) their corresponding HRTEM images and (c, f) SAED patterns taken along the $[1\bar{1}0]$ zone-axes.

Fig. S2 shows the heating procedure of the *in situ* TEM heating experiments performed on InAs $\langle 00\bar{1} \rangle$ nanowires.

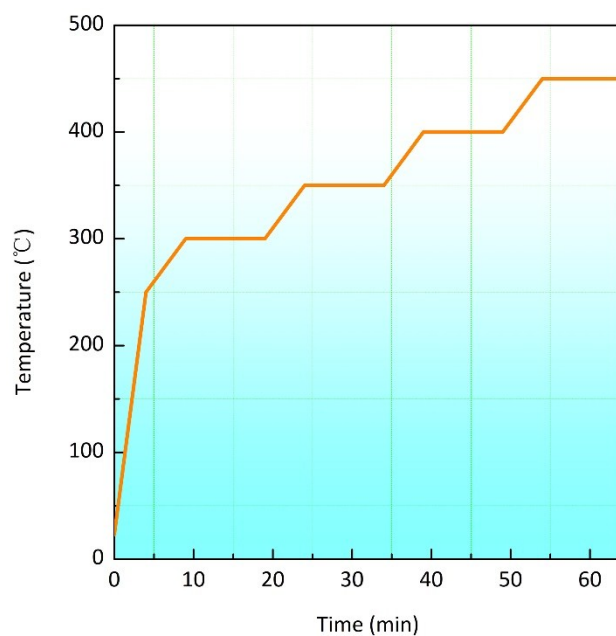


Fig. S2 The heating procedure of the *in situ* heating experiments.