Supporting Information

Synthesis of Morphology-Improved Single-Crystalline Iron Silicide

Nanowires with Enhanced Physical Characteristics

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- S1. Experimental preparation flow chart

The flow chart indicates the details of synthesizing the β -FeSi₂ nanowires.

Si (100) substrates were cleaned in acetone and isopropyl alcohol and then put into HF for 5 minutes to remove the oxide layer. Then placed in an alumina boat at the downstream

Anhydrous iron chloride powders, the precursor for iron silicide NWs, were placed in an alumina boat at the upstream. Ar was taken as carrier gas with a flow rate of 20 sccm. FexSi1-x thin film was deposited with CVD at 650 °C, followed by RTA annealing at 850 °C.

The substrate was put into the furnace tube for nanowire deposition at 850 °C. After that, the second RTA annealing was performed at 850 °C.

Figure S1. The preparation flow chart of the experiment.

S2. XRD patterns of the nanowires after the second RTA annealing



The peaks of FeSi disappeared, while the peaks of β -FeSi₂ remained, demonstrating that all the FeSi nanowires were transformed into β -FeSi₂ nanowires after the second RTA annealing.

Figure S2. X-ray diffraction patterns of the nanowires which went through the second RTA annealing process in 1, 3, 5 hrs

S3. SEM images of the β -FeSi₂ nanowires with different annealing times

Based on XRD patterns of Figure S2, the peaks of β -FeSi₂ nanowires became weaker with longer annealing time; if the annealing process was too long, the nanowires would be clumped and the crystallinity decreased. Also, scanning electron microscopy studies show the clumping phenomenon clearly in Figure S3(a)-(c).



Figure S3. SEM images of the β -FeSi₂ nanowires with different annealing times of (a)1 hr (b)3 hrs (c)5 hrs