Supporting Information

Growth of Single Crystalline Cubic Structured Tin (II) Sulfide (SnS) Nanowires by Chemical Vapor Deposition

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SI1: Experimental setup of CVD system.

Fig. SI1: Schematic diagram of chemical vapor deposition system

SI2: Au catalysts coated on sapphire and Si substrates by e-beam evaporation.

Fig. SI2: FESEM images of Au catalyst coated (a) sapphire and (b) Si substrates
**SI3:** SnS Nanostructures grown at different temperatures below 650 °C

![Image of SnS nanostructures grown at different temperatures](image)

**Fig. SI3:** Figure 1: FESEM images of SnS nanostructures grown on sapphire (left column) and Si (right column) substrates at the growth temperature of (a, b) 500, (c, d) 550 and (e, f) 600 °C, respectively.

**SI4:** Surface morphology of SnS nanostructures grown on sapphire substrates at 600 °C.

![Image of surface morphology](image)

**Fig. SI4:** FESEM images of SnS nanostructures grown at 600 °C (a) high and (b) low magnification images (consists of different morphologies)
SI5: Surface morphology of SnS NWs grown on Si substrate at 650 °C

![Image of SnS NWs grown on Si substrate at 650 °C](image01)

**Fig. SI5:** FESEM image of SnS NWs grown on Si substrate at 650 °C

SI6: SnS Nanostructures grown at different temperatures above 650 °C

![Image of SnS nanostructures grown on sapphire and Si substrates at various temperatures](image02)

**Fig. SI6:** FESEM images of SnS nanostructures grown on sapphire (left column) and Si (right column) substrates at the growth temperature of (a, b) 700, (c, d) 800 and (e, f) 950 °C, respectively.
SI7: Diameters of SnS nanowires present on top surface of the structures, which were extracted by using ImageJ software for different samples grown at different temperatures.

![Graph showing variation of diameter of SnS nanowire as a function of different nanowires present on the top surface of the structures.](image)

**Fig. SI7:** Variation of diameter of SnS nanowire as a function of different nanowires present on the top surface of the structures.

SI8: Chemical composition of SnS NWs grown at 650 °C.

![EDS spectrum of SnS NWs on Si substrates at the growth temperature of 650 °C.](image)

**Fig. SI8:** EDS spectrum of SnS NWs on Si substrates at the growth temperature of 650 °C

SI9: Calculation of lattice parameter(s) of SnS nanowires

From the standard geometric concepts, the following equation can be derived for a unit cell lattice consists of a, b, c as lattice constants, d as space between two consecutive atoms and h, k,
l are Miller indices.

\[ \frac{1}{d^2} = \frac{h^2}{a^2} + \frac{k^2}{b^2} + \frac{l^2}{c^2} \]

For cubic structured lattice \( a = b = c \), therefore, the above equation can be written as

\[ \frac{1}{d^2} = \frac{1}{a^2} (h^2 + k^2 + l^2) \]

In the present study, the obtained \( d \) is 0.275 nm and thus, \( a^2 = 4d^2 \),

\[ \implies a = 0.55 \text{ nm} \]

\( = b = c \).

**SI10:** Survey scan of the XPS spectrum of SnS nanowires

![Survey scan of XPS spectrum of SnS nanowires](image)

**Fig. SI10:** Survey scan of XPS spectrum of SnS nanowires grown on Si substrate at the growth temperature of 650 °C

**SI11:** SnS films on sapphire substrate at a growth temperature of 450 °C
**Fig. SI11:** FESEM image of SnS films grown at the growth temperature of 450 °C