

Supplementary Materials

# Phase Change Ge-Rich Ge–Sb–Te/Sb<sub>2</sub>Te<sub>3</sub> Core-Shell Nanowires by Metal Organic Chemical Vapor Deposition

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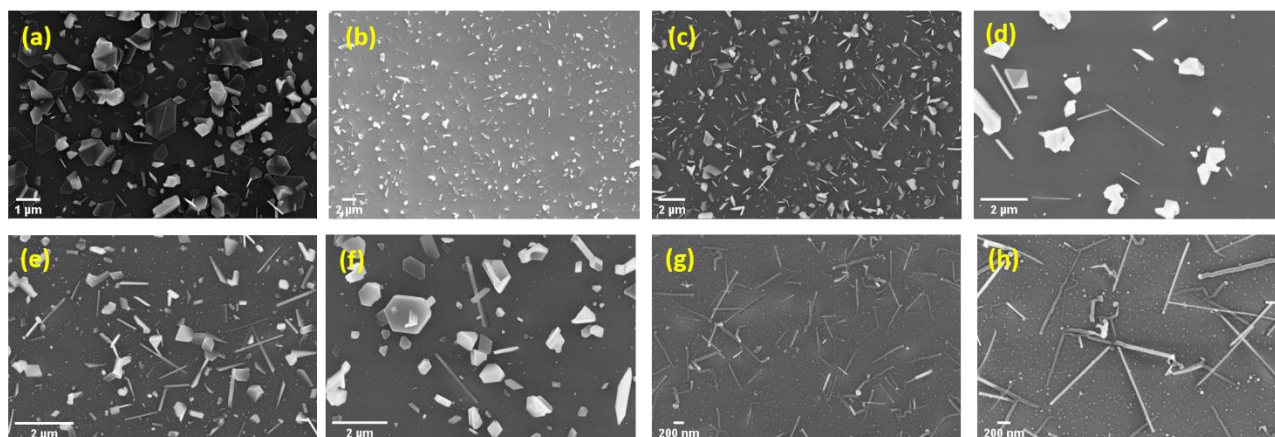
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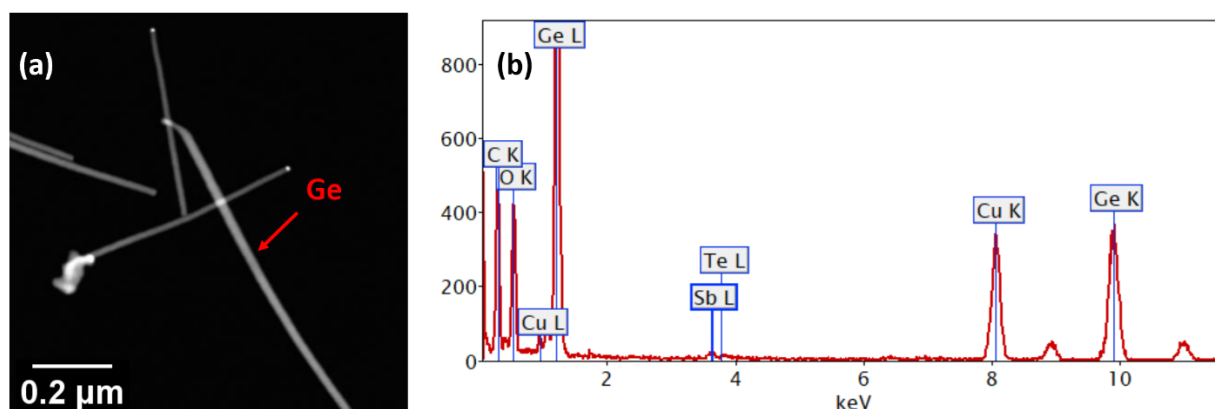
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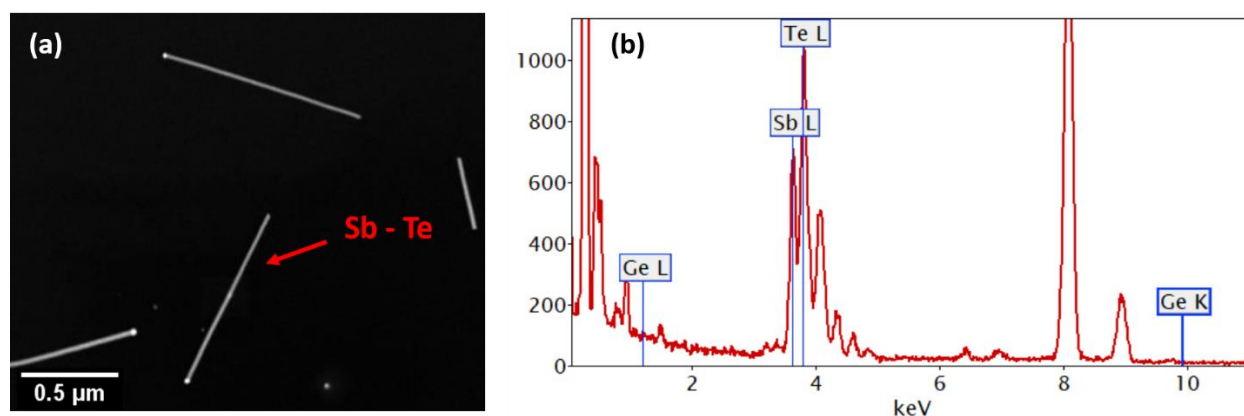
**Figure S1.** Plan view SEM images on MOCVD growth of Ge–Sb–Te alloy with 10 nm Au NP on SiO<sub>2</sub>/Si substrates with the growth parameters mentioned in Table S1, respectively.

**Table S1.** Growth parameters corresponding to Figure S1.

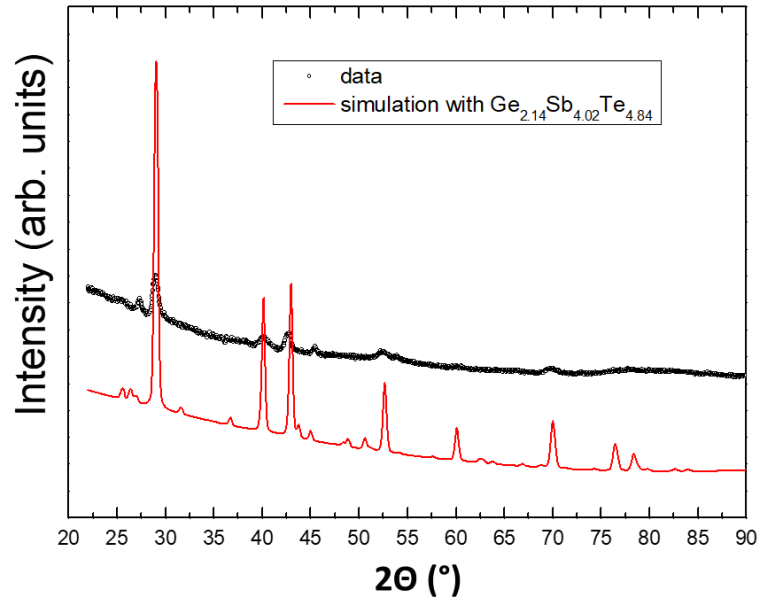
Figure S1	Growth Parameters					
	Temperature (°C)	Pressure (mbar)	Time (min)	TDMAGe (Partial Pressure) (mbar)	SbCl <sub>3</sub> (Partial Pressure) (mbar)	DSMTe (Partial Pressure) (mbar)
(a)	325	100	120	$3.91 \times 10^{-3}$	$6.04 \times 10^{-3}$	$8.81 \times 10^{-3}$
(b)	370	100	120	$7.83 \times 10^{-3}$	$2.42 \times 10^{-3}$	$3.52 \times 10^{-3}$
(c)	400	50	120	$2.94 \times 10^{-3}$	$2.42 \times 10^{-3}$	$3.52 \times 10^{-3}$
(d)	400	50	120	$2.94 \times 10^{-3}$	$1.21 \times 10^{-3}$	$8.81 \times 10^{-3}$
(e)	375	100	120	$1.17 \times 10^{-3}$	$1.81 \times 10^{-3}$	$2.64 \times 10^{-3}$
(f)	380	100	120	$3.91 \times 10^{-3}$	$1.51 \times 10^{-3}$	$2.11 \times 10^{-3}$
(g)	380	300	120	$4.77 \times 10^{-3}$	$1.38 \times 10^{-3}$	$5.37 \times 10^{-3}$
(h)	380	300	180	$4.77 \times 10^{-3}$	$1.38 \times 10^{-3}$	$5.37 \times 10^{-3}$



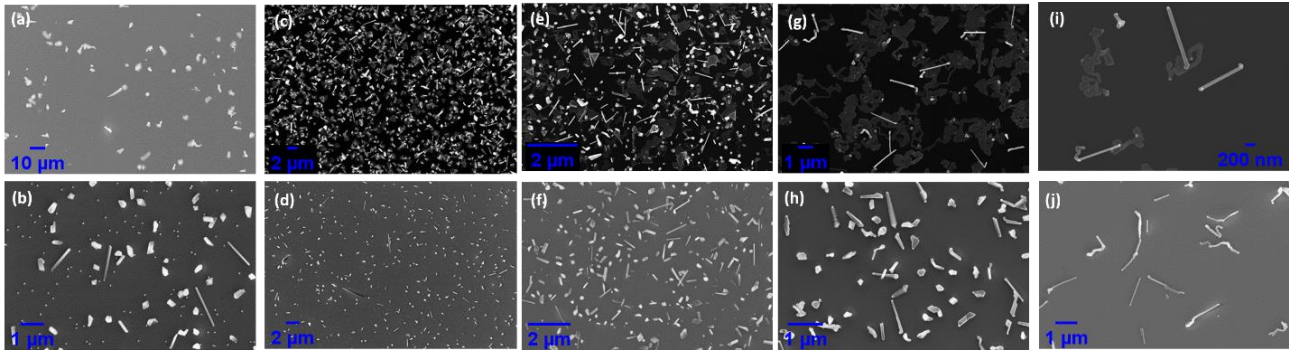
**Figure S2.** (a) STEM image of as grown Ge-Sb-Te with 10 nm Au NP on SiO<sub>2</sub>/Si substrates at T = 400 °C, P = 50 mbar, t = 120 min, TDMAGe partial pressure =  $2.94 \times 10^{-3}$  mbar, SbCl<sub>3</sub> partial pressure =  $2.42 \times 10^{-3}$  mbar, DSMTe partial pressure =  $3.52 \times 10^{-3}$  mbar, (b) the composition of the NWs resulted to be mainly that of Ge, as indicated by the EDX spectrum.



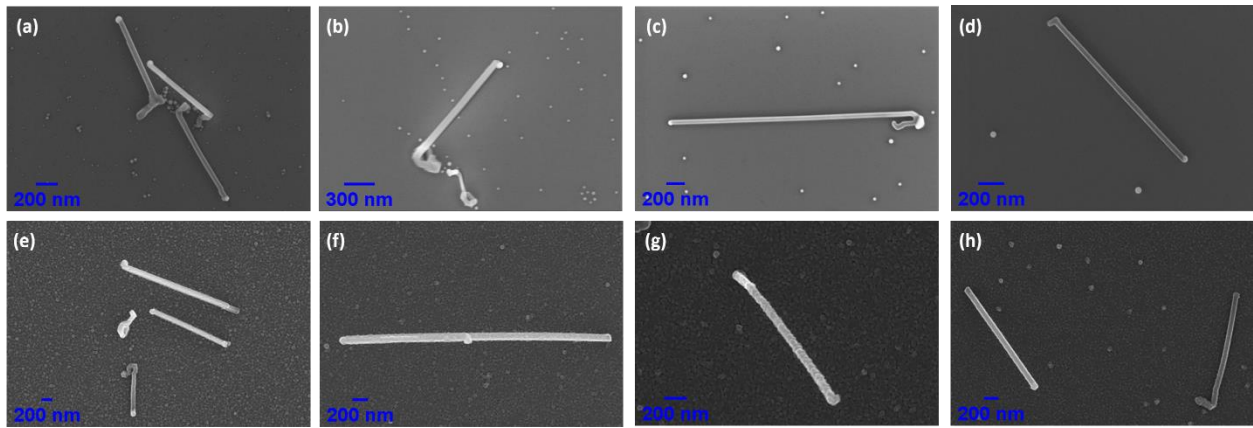
**Figure S3.** (a) STEM-EDX images showing the presence of NWs with 10 nm Au NP on SiO<sub>2</sub>/Si substrates at T = 380 °C, P = 300 mbar, t = 180 min, TDMAGe partial pressure =  $4.77 \times 10^{-3}$  mbar, SbCl<sub>3</sub> partial pressure =  $1.38 \times 10^{-3}$  mbar, DSMTe partial pressure =  $5.37 \times 10^{-3}$  mbar; (b) the composition of the NWs resulted to be mainly that of Sb<sub>2</sub>Te<sub>3</sub>, as indicated by the EDX spectrum.



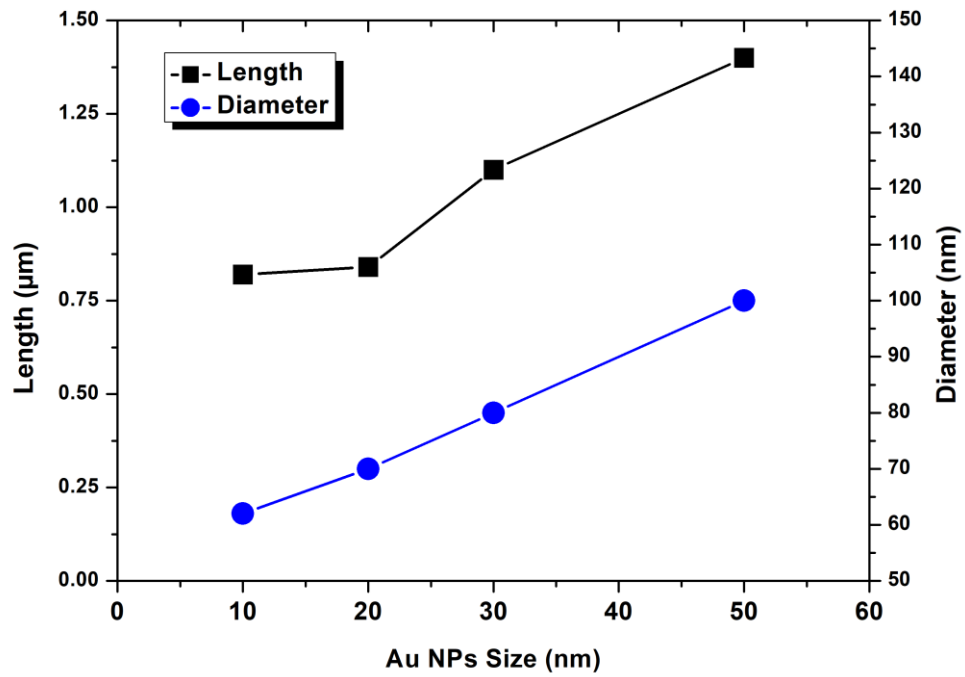
**Figure S4.** XRD analysis of NWs with 10 nm Au NP on SiO<sub>2</sub>/Si substrates at T = 380 °C, P = 300 mbar, t = 180 min, TDMAGE partial pressure =  $4.77 \times 10^{-3}$  mbar, SbCl<sub>3</sub> partial pressure =  $1.38 \times 10^{-3}$  mbar, DSMTe partial pressure =  $5.37 \times 10^{-3}$  mbar.



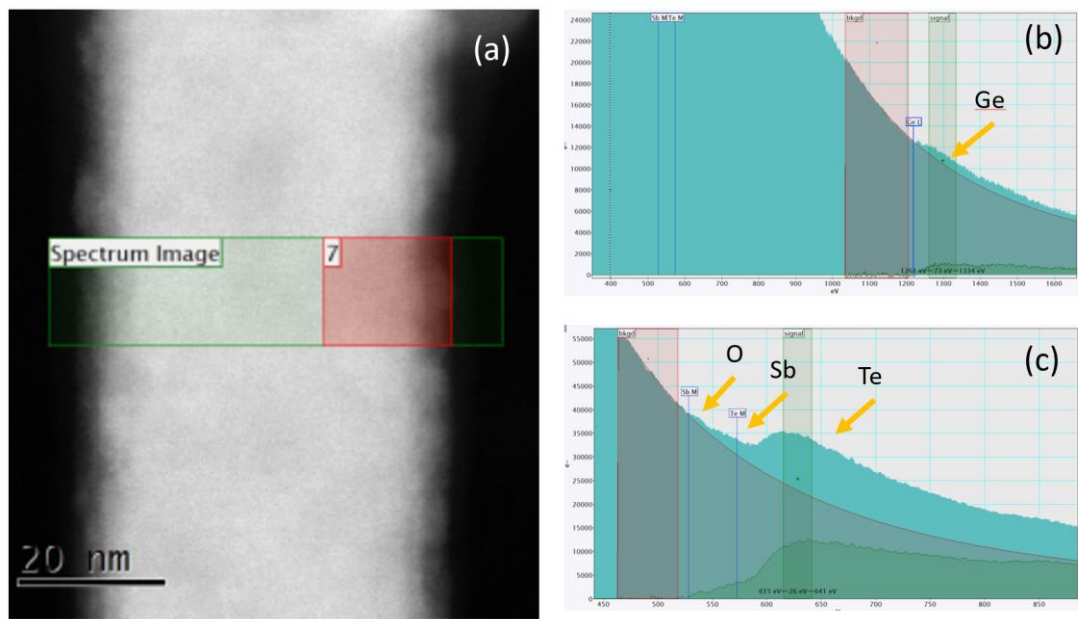
**Figure S5.** Plan view SEM images on MOCVD growth of Ge-Sb-Te nanowires with 50 nm Au NP on Si(100) and SiO<sub>2</sub>/Si substrates at T = 400 °C, P = 50 mbar, t = 60 min, TDMAGE partial pressure =  $3.35 \times 10^{-3}$  mbar, (a,b) SbCl<sub>3</sub> partial pressure =  $2.07 \times 10^{-3}$  mbar, DiPTe partial pressure =  $7.07 \times 10^{-3}$ , (c,d) SbCl<sub>3</sub> partial pressure =  $1.04 \times 10^{-3}$  mbar, DiPTe partial pressure =  $7.07 \times 10^{-3}$  mbar, (e,f) SbCl<sub>3</sub> partial pressure =  $3.45 \times 10^{-4}$  mbar, DiPTe partial pressure =  $7.07 \times 10^{-3}$  mbar, (g,h) SbCl<sub>3</sub> partial pressure =  $1.73 \times 10^{-4}$  mbar, DiPTe partial pressure =  $8.58 \times 10^{-3}$  mbar, (i,j) SbCl<sub>3</sub> partial pressure =  $5.18 \times 10^{-5}$  mbar, DiPTe partial pressure =  $8.58 \times 10^{-3}$  mbar, respectively.



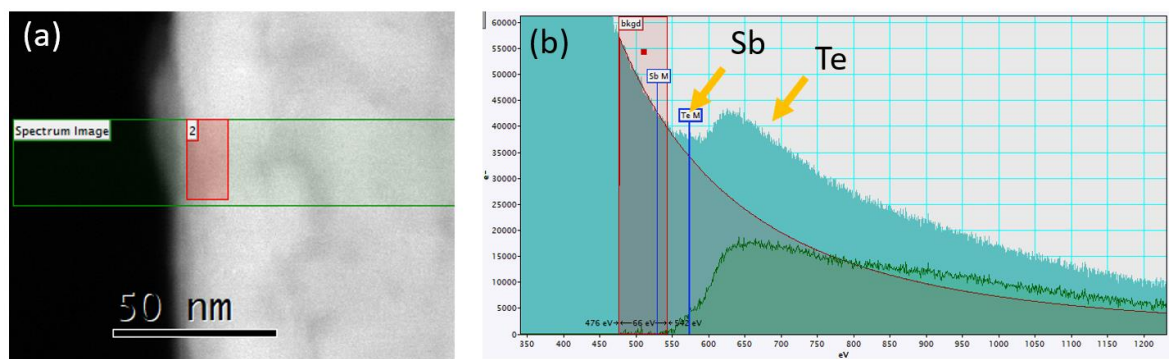
**Figure S6.** Plan view SEM images on MOCVD growth of (a–d) Ge-rich Ge–Sb–Te core nanowires, and (e–h) Ge-rich Ge–Sb–Te/Sb<sub>2</sub>Te<sub>3</sub> core-shell NWs with 10, 20, 30 and 50 nm Au NPs on SiO<sub>2</sub>/Si substrate, respectively.



**Figure S7.** Statistical plot of the average length and diameter distribution of Ge-rich Ge–Sb–Te core nanowires on SiO<sub>2</sub>/Si with 10, 20, 30 and 50 nm Au NPs.



**Figure S8.** STEM image of a Ge-rich Ge-Sb-Te core nanowire portion (a) and its corresponding EELS spectra for Ge L-edge (b) and Sb-Te M-edge (c).



**Figure S9.** STEM image of a Ge-rich Ge-Sb-Te/Sb<sub>2</sub>Te<sub>3</sub> core-shell nanowire portion (a) and its corresponding EELS spectrum (b).