Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C

Supplementary Information

Three-Dimensionally Kinked High-Conducting CoGe Nanowire Growth Induced by Rotational Twinning

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1. Experimental setup

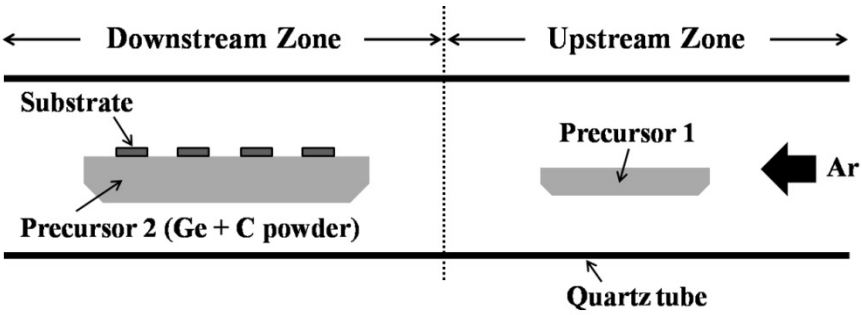

Figure S1. Experimental setup for synthesis of monoclinic CoGe NWs. The horizontal tube furnace has independently controlled two heating zones.

2. EDS spectrum

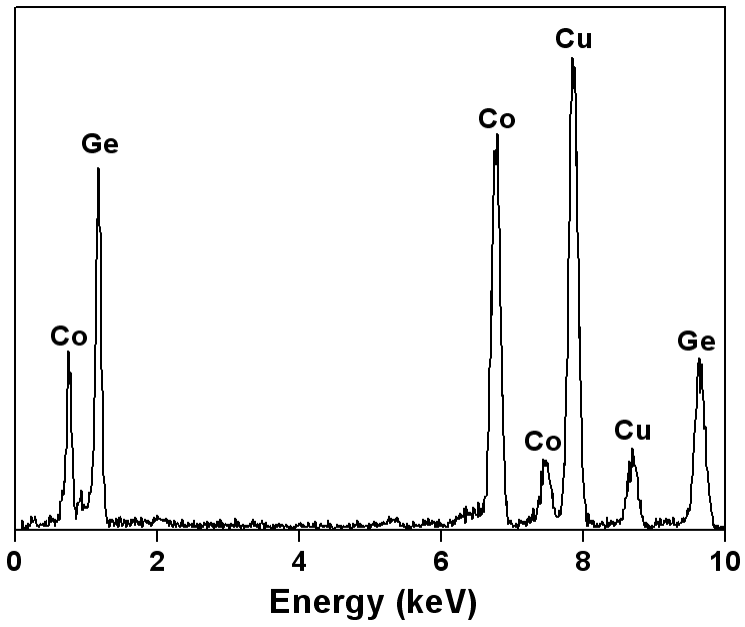

Figure S2. TEM-EDS spectrum of the horizontal NW in Figure 2 of the manuscript. The analysis of this result confirms that the NW contains only Co and Ge, in a ratio of ~ 1:1 (Cu peaks are due to a TEM grid).

3. Co_5Ge_7 NWs grown on a YSZ (100)

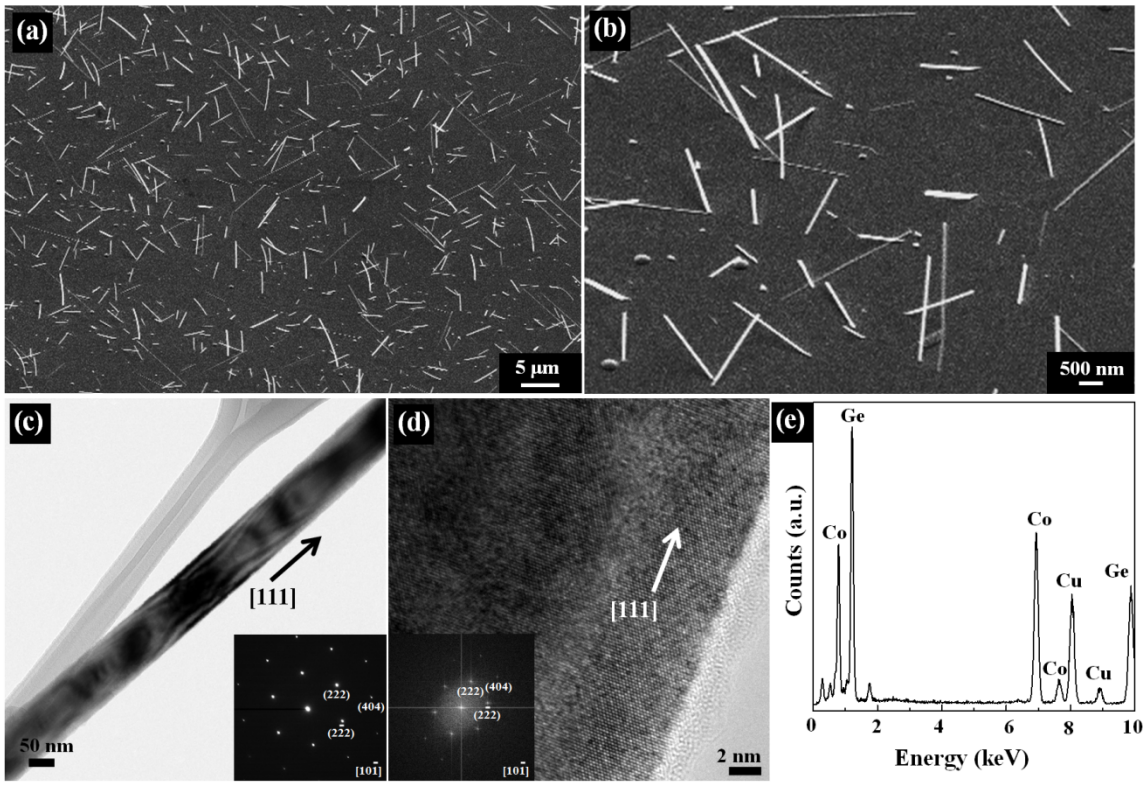

Figure S3. SEM and TEM analyses of Co_5Ge_7 NWs grown on a YSZ (100) substrate. (a,b) SEM images of randomly-oriented Co_5Ge_7 NWs. (c) Representative TEM image of NW. SAED pattern (inset of Figure S3(c)) is perfectly indexed to Co_5Ge_7 with a tetragonal lattice along the $[10\bar{1}]$ zone axis. The NWs have single crystallinity and grow along the [111] direction. (d) HRTEM image of the NW in (c). Inset shows FFT pattern (inset), which is also well matched to tetragonal Co_5Ge_7 phase. (e) TEM-EDS spectrum of the NW in (c). The analysis of this result confirms that the NWs contain only Co and Ge, in a ratio of ~5:7.

4. Co_5Ge_7 NWs grown on *c*-cut sapphire substrates

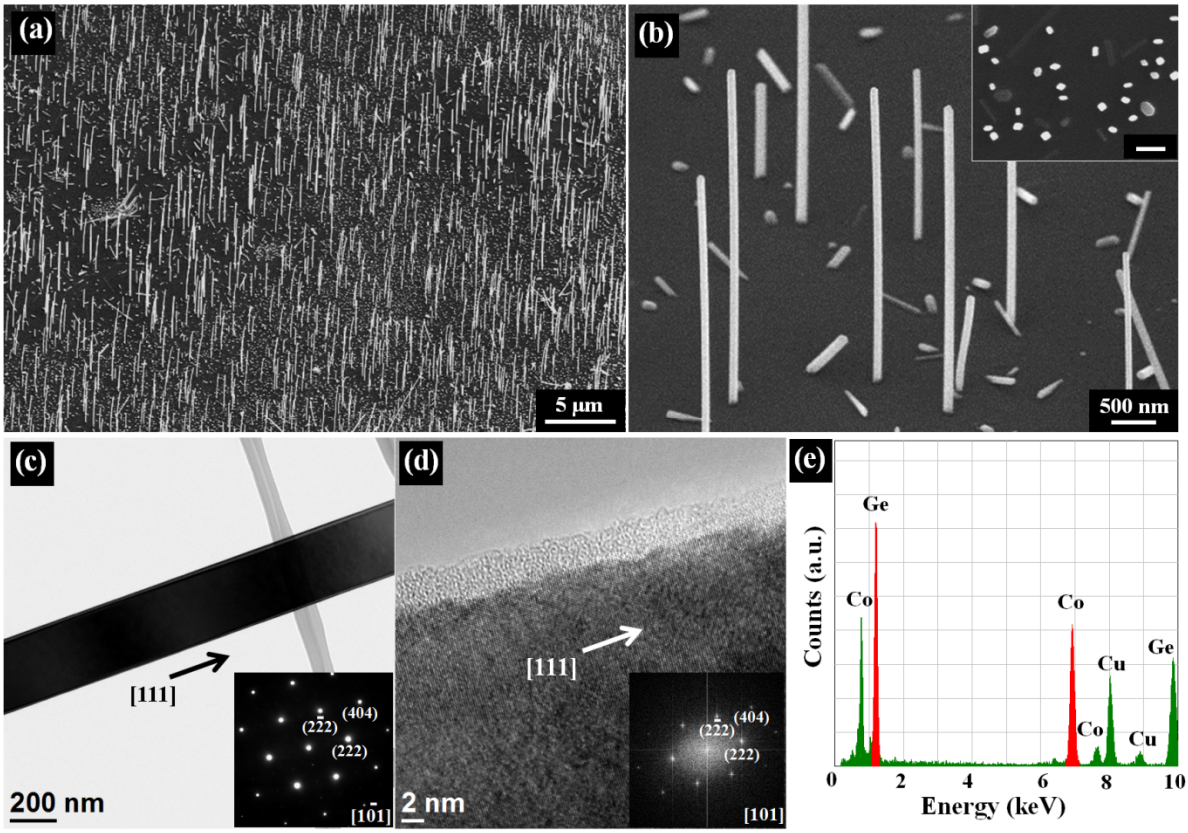

Figure S4. SEM and TEM analyses of Co_5Ge_7 NWs grown on a *c*-cut sapphire substrate. (a,b) SEM images of vertically-grown Co_5Ge_7 NWs on the substrate. (c) A representative TEM image of the Co_5Ge_7 NW. The inset shows that the SAED pattern is perfectly indexed to Co_5Ge_7 with a tetragonal lattice along the $[10\bar{1}]$ zone axis. The NW has single crystallinity and grows along the [111] direction. (d) HRTEM image of the NW in (c). Inset shows an FFT pattern (inset), which is also well matched to a tetragonal Co_5Ge_7 phase. (e) TEM-EDS spectrum of the NW in (c). The analysis of this result confirms that the NWs contain only Co and Ge, in a ratio of ~5:7.

5. TEM analysis of a free-standing CoGe NW

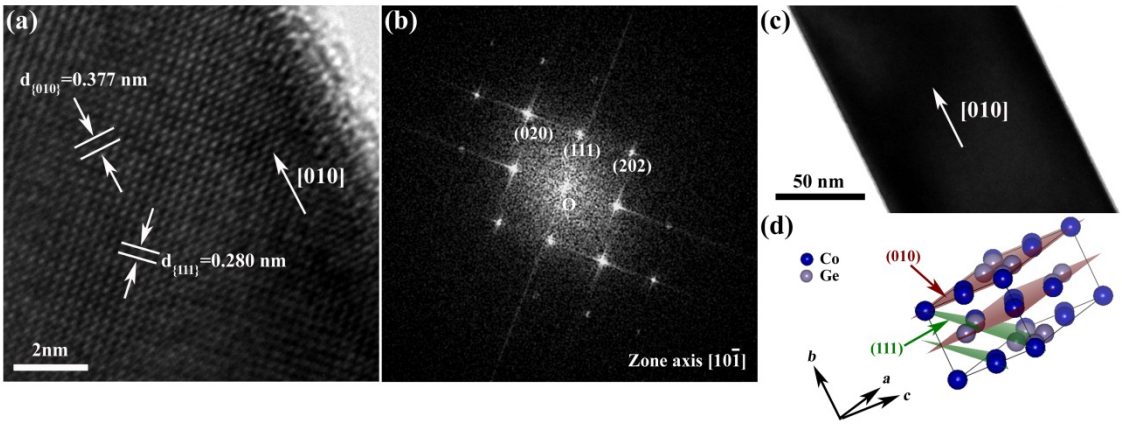

Figure S5. Detailed structural analysis of a free-standing CoGe NW directly grown on a YSZ substrate. (a) Representative HRTEM image. The observed lattice planes of a CoGe NW with a spacing of 0.377 and 0.280 nm correspond to the (010) and (111) planes of monoclinic CoGe, respectively. (b) The FFT pattern is perfectly indexed to CoGe with a monoclinic lattice along $[10\bar{1}]$ zone axis. (c) The freestanding NWs grow along the [010] direction identical to the growth direction of horizontal NWs. (d) The atomic structure of monoclinic CoGe. The (010) and (111) planes are indicated by red and green regions.