Supporting Information for "Tunable Catalytic Alloying Eliminates Stacking-Faults in Compound Semiconductor Nanowires"

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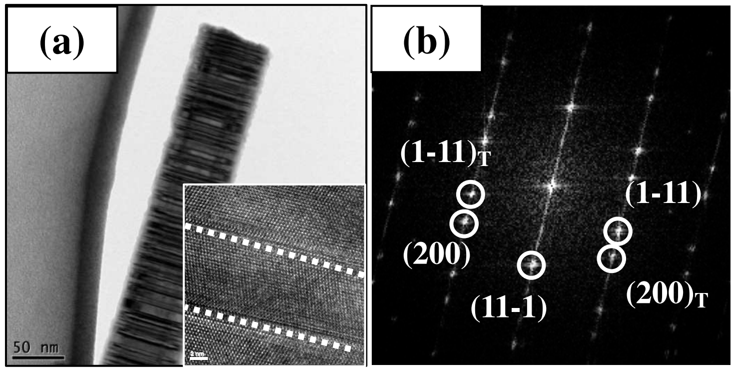
FIGURE CAPTIONS

Figure S1. (a), (b) A representative TEM image and its diffraction pattern of a ZnTe NW at the bright-field (BF) condition when the electron beam is along the [011], which consisted of two sets of diffraction spots as indexed that indicate existing twin plane as shown in HRTEM image of the inset.. (c-h) Selected area diffraction patterns (SADP) and dark field (DF) TEM images of ZnTe NW when excited different diffracted beam, (c), (d) $(200)_T$, (e), (f) (1-11), (g), (h) (11-1). In the BF and DF TEM images, ZnTe NW shows alternating bright and dark contrast perpendicular to the NW growth direction, especially higher contrast in DF images by using only one diffracted beam as shown in (d, f). From (a ~ h), we confirmed that ZnTe NW are composed of two different {111} plane with periodic twin boundaries along the NW growth direction.

Figure S2. (a) The (111) diffraction peak positions, the converted lattice plane distances, the lattice parameters, and the full width half maximum (FWHM) of $Cd_{1-x}Zn_xTe$ NW arrays, extracted from Figure 2. (b) XRD θ-2θ scans of (A) ZnTe, (B) $Cd_{0.82}Zn_{0.18}Te$, (C) ZnTe NW arrays. The spectrum is normalized by its maximum intensity for a qualitative comparison. Three main peaks correspond to (111), (200), (220) plane of cubic zinc blende (ZB) structure. Closed and open squares denote the diffraction peak of hexagonal wurtzite (WZ) structure of ZnTe and CdTe crystals. The WZ peak is only detected in the pure CdTe and ZnTe NW arrays.

Figure S3. Absorption edge variation of $Cd_{1-x}Zn_xTe$ ($0 \leq x \leq 1$) NWs determined from the spectral photocurrent measurement at Figure 6(a). The observed variation is consistent with bulk $Cd_{1-x}Zn_xTe$ crystals[1].

BF Image (ZnTe NWs)



DF Image at Different Two-beam Condition (ZnTe NWs)

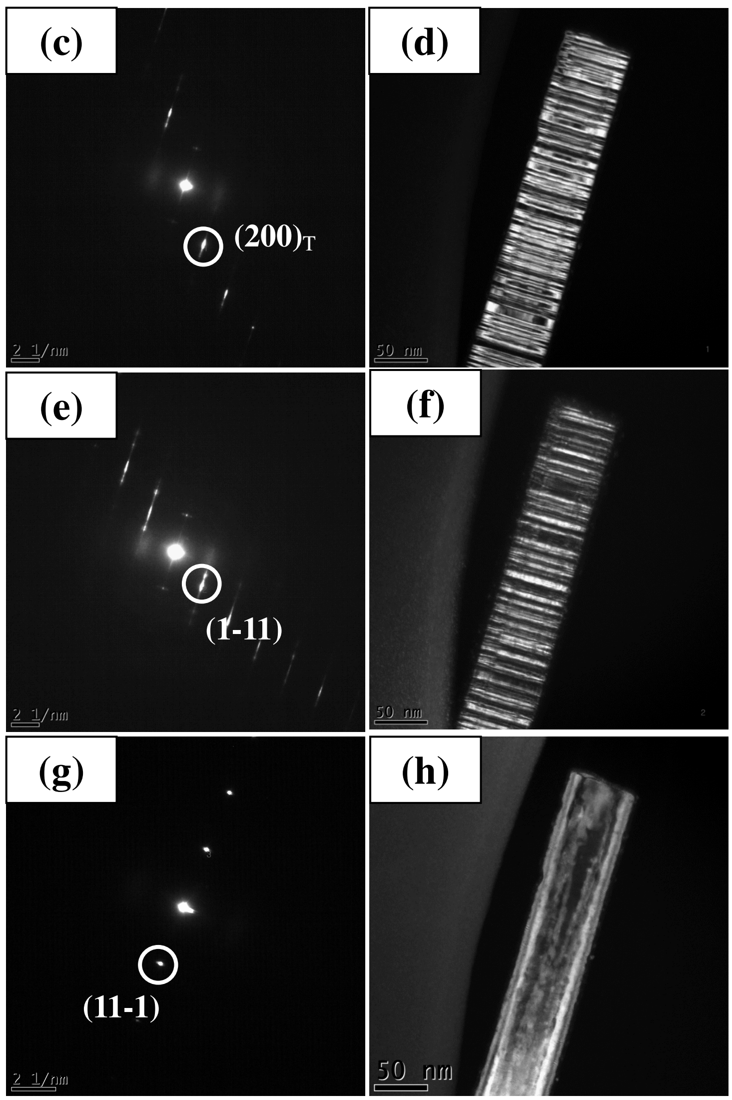


Figure S1

(a)

	2θ(111)(°)	**d(111)(Å)**	**a(Å)**	**x**	**FWHM(°)**
ZnTe	25.26	3.535	6.123	1	0.075
1	25.02	3.566	6.178	0.837	0.125
2	24.88	3.586	6.210	0.740	0.150
3	24.50	3.638	6.302	0.481	0.200
4	24.40	3.652	6.329	0.399	0.130
5	24.10	3.694	6.412	0.181	0.105
6	23.94	3.718	6.457	0.061	0.080
CdTe	23.86	3.729	6.480	0	0.125

(b)

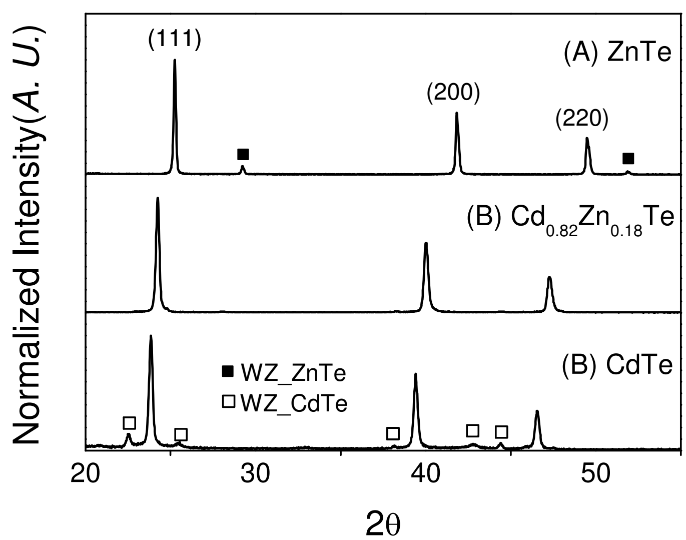


Figure S2

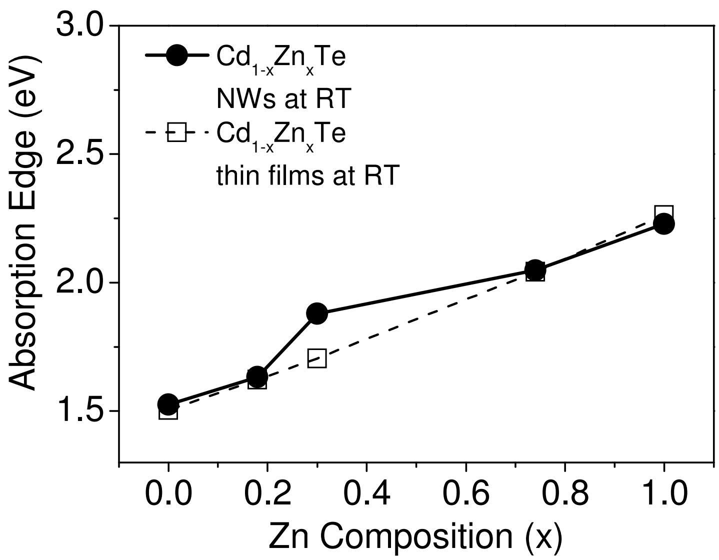

3.0
2.5
2.0
1.5
Absorption Edge (eV)
Cd1-xZnxTe
NWs at RT
Cd1-xZnxTe
thin films at RT
0.0
0.2
0.4
0.6
0.8
1.0
Zn Composition (x)

Figure S3

REFERENCES

[1] Tobin, S. P.; Tower, J. P.; Norton, P. W; Chandler-Horowitz, D.; Amirtharaj, P. M.; Lopes, V. C.; Duncan, W. M.; Syllaios, A. J.; Ard, C. K.; Giles, N. C.; Lee, J.; Balasubramanian, R.; Bollong, A. B.; Steiner, T. W.; Thewalt, M. L. W.; Bowen, D. K.; Tanner, B. K. *J. Electron. Mater.* **1995**, 24, 697