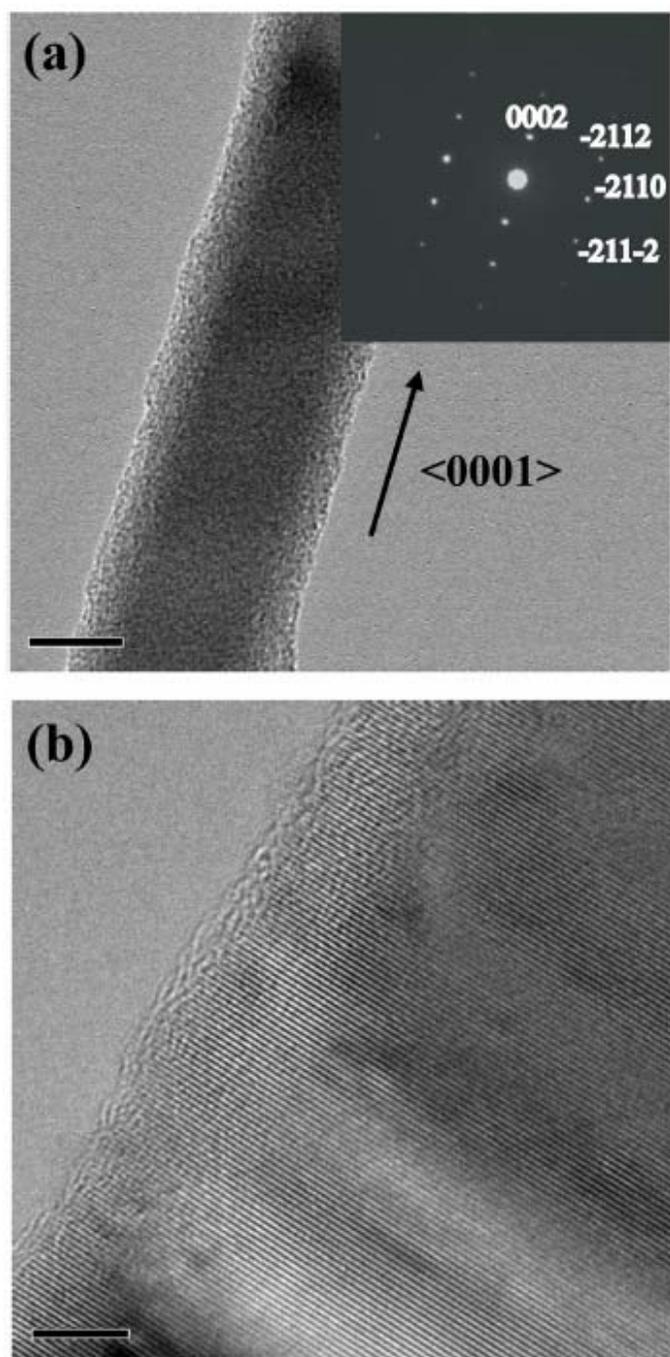
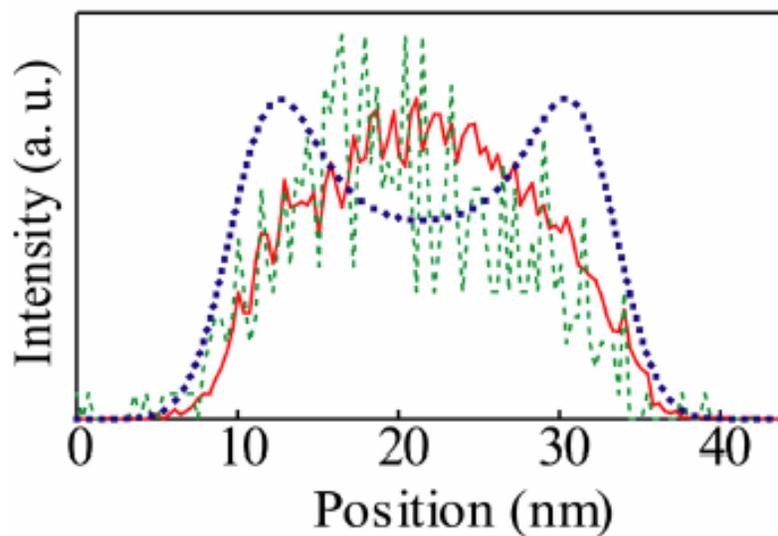


## Supporting Information



**Figure S1.** (a) TEM image of Mn:ZnS nanowire; scale bar is 20 nm. Inset: Electron diffraction pattern recorded along the [01-10] zone axis from the nanowire and indexed to the wurtzite structure with  $\langle 0001 \rangle$  growth direction. (b) HRTEM image recorded along [01-10] zone axis of the same nanowire; scale bar is 5 nm. EDX measurements show that the Mn concentration is 3%.



**Figure S2.** Normalized EDX line scan data for Cd (solid red line) and Mn (dashed green line) recorded from Figure 1c. The Cd and Mn profiles exhibit excellent agreement after normalizing intensities. A model calculation of the Mn EDX profile assuming that all of the Mn is localized in a shell 5 nm in thickness is plotted (dotted blue line) for comparison, and is clearly inconsistent with the observed data (green dashed line).