

Supplementary information

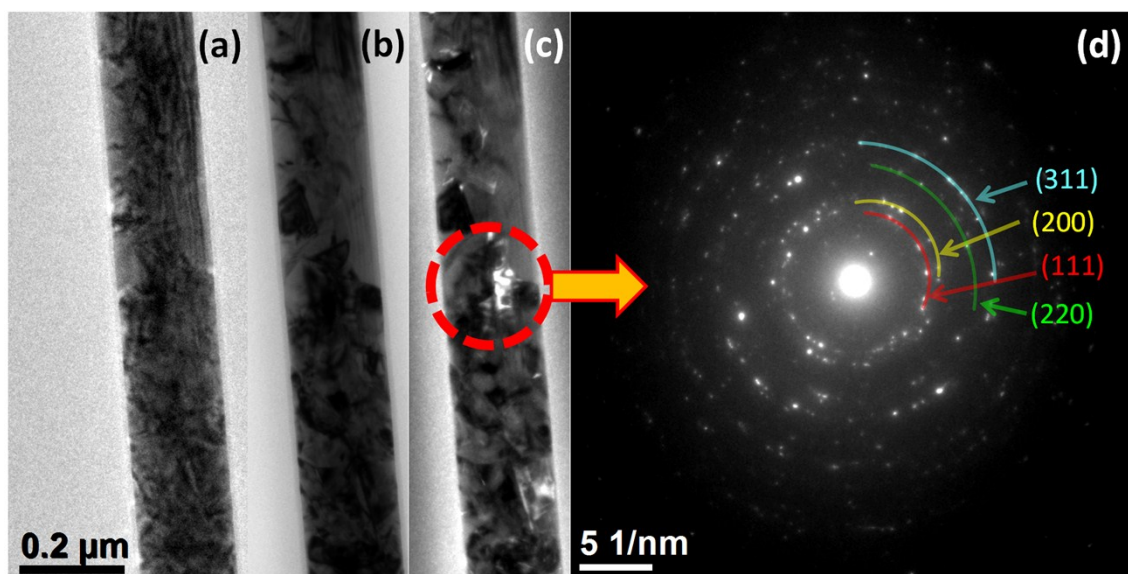


Figure 1S. TEM images of Ni nanowires: (a) CTEM, (b) bright field and (c) dark field of the same nanowire, where different crystals can be distinguished. (d) Selected area electron diffraction, SAED, pattern obtained from the section of the Ni nanowire highlighted in panel c).

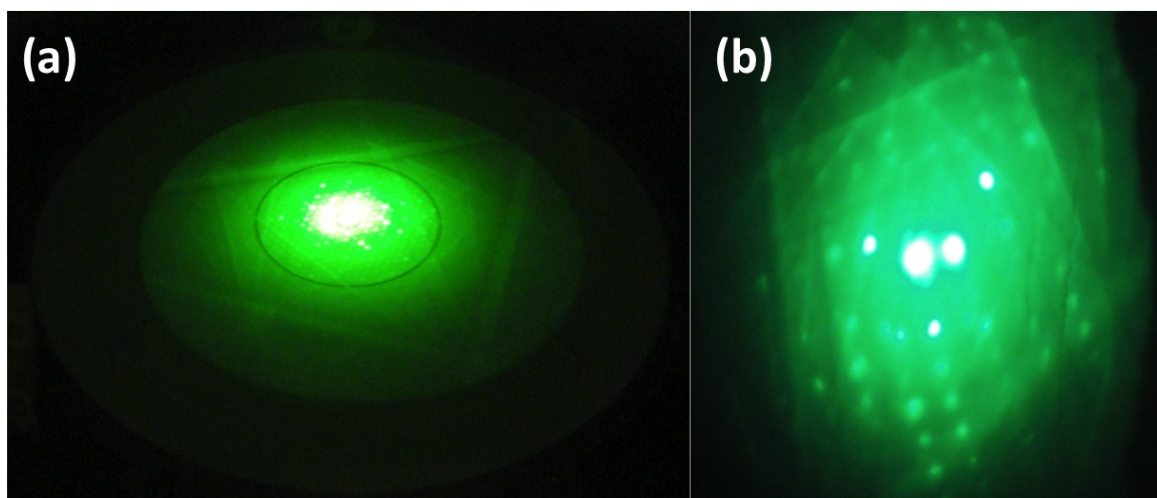


Figure 2S. SAED patterns of a $\text{Co}_{83}\text{Ni}_{17}$ segment of a $\text{Co}_{58}\text{Ni}_{42}/\text{Co}_{83}\text{Ni}_{17}$ multisegmented nanowire measured at high electron beam intensity to observe Kikuchi lines.

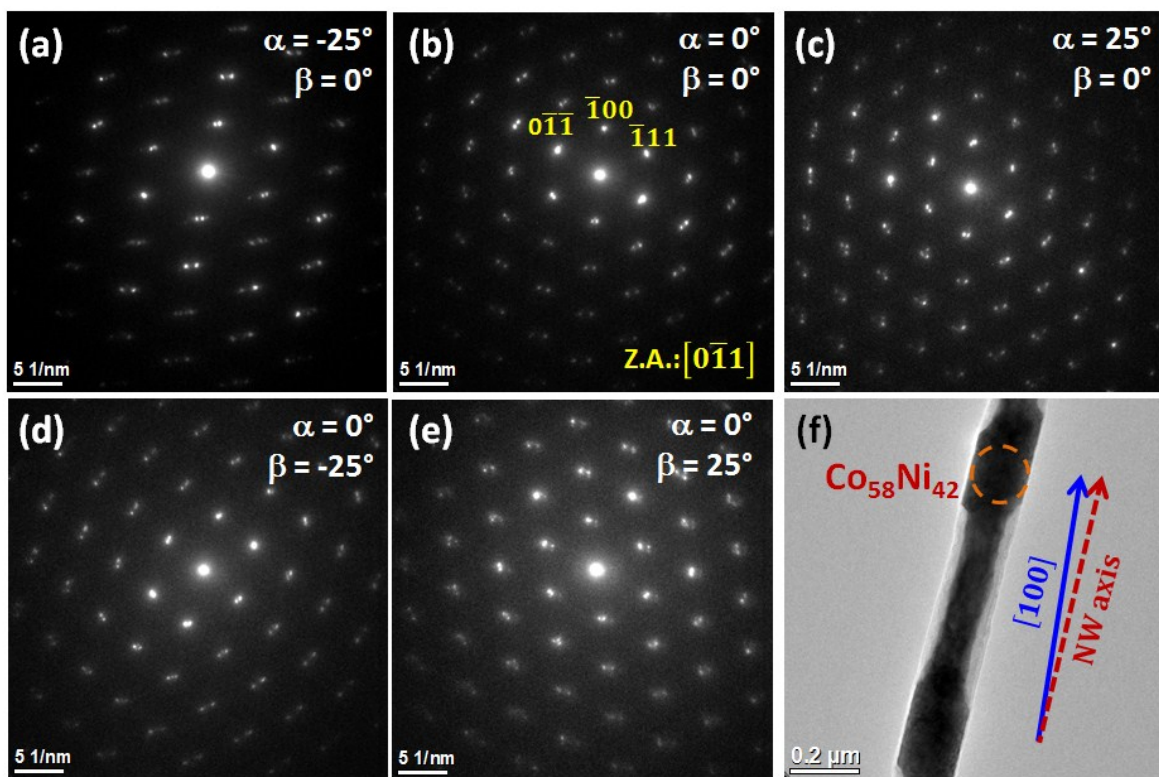


Figure 3S. a)-e) SAED patterns of the $\text{Co}_{58}\text{Ni}_{42}$ segment of the studied $\text{Co}_{58}\text{Ni}_{42}/\text{Co}_{83}\text{Ni}_{17}$ multisegmented NW obtained at different tilted angles. f) TEM image of the studied $\text{Co}_{58}\text{Ni}_{42}/\text{Co}_{83}\text{Ni}_{17}$ multisegmented NW. The circle highlights the segment of the NW studied in panels a)-e).

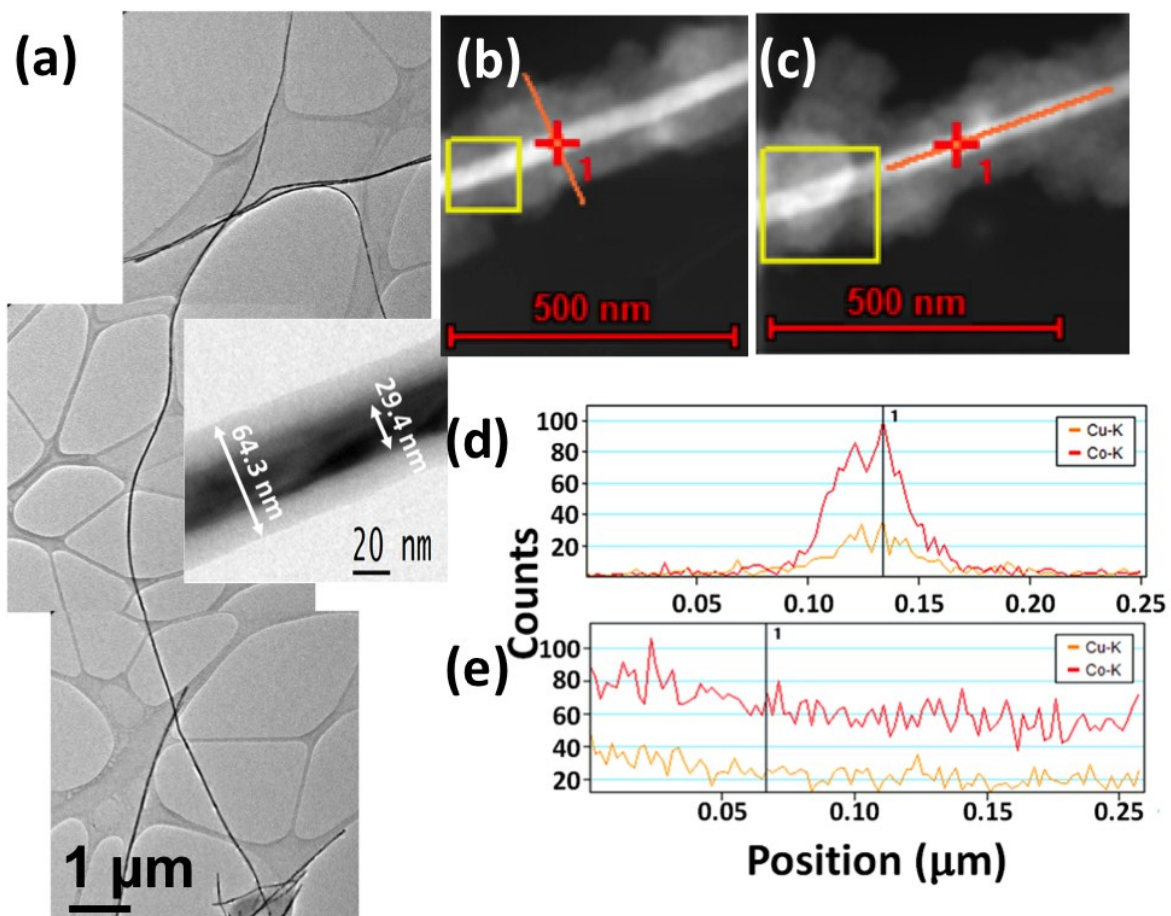


Figure 4S. a) TEM images of $\text{Co}_{73}\text{Cu}_{27}$ NWs. b) and c) HAADF-STEM images of a $\text{Co}_{73}\text{Cu}_{27}$ NW. Orange lines indicate the performed line scans of EDS measurements across b) wire widthwise and c) along the wire axis. d) and e) Co and Cu distributions obtained in the line scans marked in panels b) and c) respectively.