Supporting Information:

Magnetic properties of planar nanowire arrays of Co fabricated on oxidized step-bunched silicon templates

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In the bulk predominant structural phase of Co is *hcp and* stabilization of fcc-Co phase at room temperature (RT) is difficult. However, stabilization of fcc-Co phase at RT is achieved under non-equilibrium conditions as has been reported previously [S1, S2]. Here, we show evidence for the presence of *fcc*-Co regions within our samples through the transmission electron microscopy (TEM) investigations and related analysis. These results are in-line with the previous knowledge. We would like to mention that the structure of the majority of Co-crystallites is found to be *hcp*-Co.

In Figure S1a we show a HRTEM image of a Co crystallite and its corresponding fast Fourier transform (FFT) pattern, which we assign to the [011] pattern of *fcc*-Co.

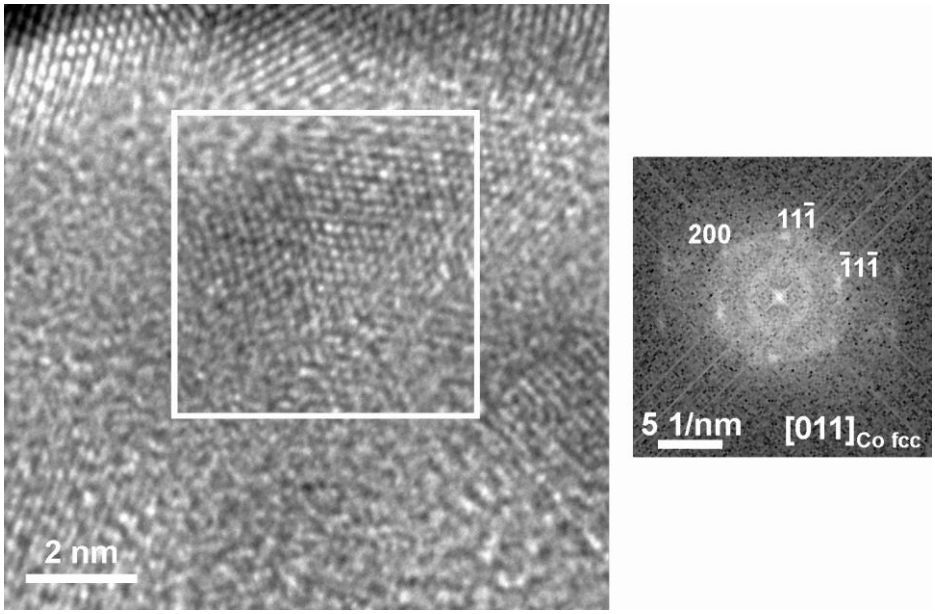

Figure S1a. HRTEM image of a Co-NW crystallite with *fcc*-Co structure viewed along the [011] zone axis and its corresponding Fast Fourier Transform

The indexing of the FFT pattern is shown in Figure S1b. The principal spots spacings correspond to the following interplanar distances: (A) 1.83 Å, (B) 2.08 Å and (C) 2.06 Å and the angles between them are: $ø_{A-B}= 55^o$ and $ø_{B-C}= 70^o$. This pattern is fully consistent with the fcc-Co [011] pattern, shown in (b). However, no pattern in the hcp-Co structure is found to match with the FFT pattern of the crystallite. Moreover, there is no interplanar spacing at 1.8 Å for *hcp*-Co.

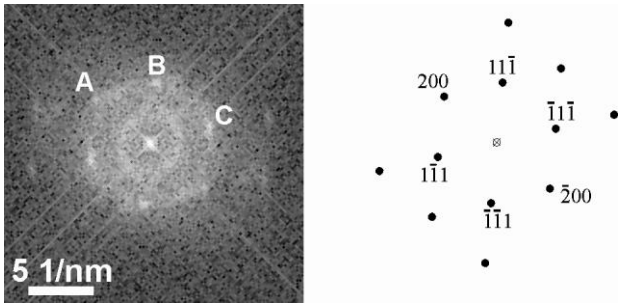

Figure S1b. Experimental Fast Fourier Transform of the crystallite shown in Figure S1 (left) and theoretical pattern for *fcc*-Co [011] zone axis (right)

Evidence of the presence of *fcc*-CoO is provided in Figure S2 showing two *fcc*-CoO crystallites viewed along the [001] zone axes.

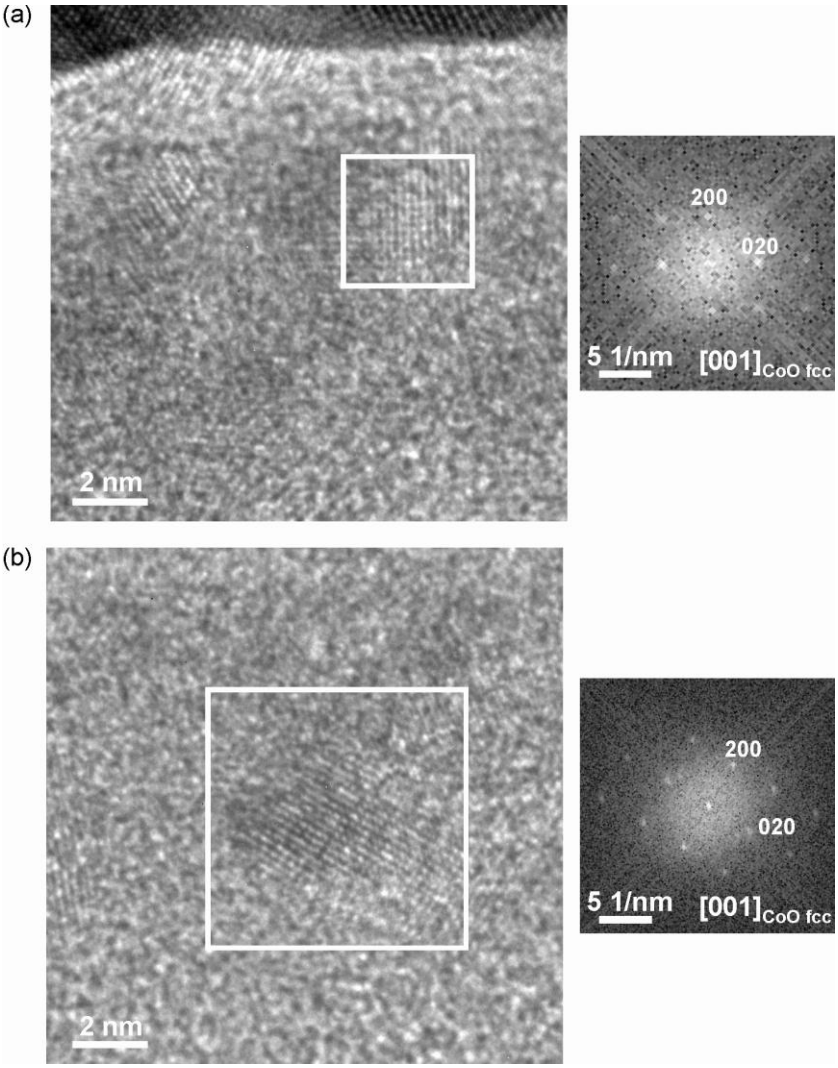

Figure S2. HRTEM images of two Co-NW crystallites with *fcc*-CoO structure viewed along the [001] zone axes and their corresponding Fast Fourier Transforms

References:

[S1] Li Hong, and Tonner B P 1989 Phys. Rev. B 40 10241–10248

[S2] Kief M T, and Egelhoff, Jr W F 1993 Phys. Rev. B 47 10785