Description of Additional Supplementary Files

Supplementary Movie 1

Description: Liquid-phase TEM movie of AuAg alloy **chiral** seed nanowire (chiral) in DI water (AuAg BCB nanowire) without the addition of other salt. The movie is played at 10 times faster than real time. The electron dose rate was 7.5 $e \cdot Å^{-2} \cdot s^{-1}$. Scale bar: 5 nm.

Note: the electron beam dose was calculated by using the following formulation:

$$D = J\Delta t = (\frac{4}{\pi})(\frac{I_b}{d^2})\Delta t$$

Where $d=d_i/M_i$ can be determined by imaging the specimen plane at a magnification M_i and measuring the image diameter d_i.

Supplementary Movie 2

Description: Atomic resolution liquid-phase TEM movie showing the lattice formation during Pd atom deposition on **chiral** AuAg seed nanowire as well as the area increase with the addition of ascorbic acid as reducing agent. The movie is played at 10 times faster than real time. The electron dose rate was 8.4 $e \cdot Å^{-2} \cdot s^{-1}$.

Supplementary Movie 3

Description: Liquid-phase TEM movie of AuAg BCB nanowire in DI water with the presence of Pd nanoparticle deposition on **chiral** AuAg seed nanowire with the addition of ascorbic acid as reducing agent. The movie is played at 15 times faster than real time. The electron dose rate was 7.5 $e \cdot Å^{-2} \cdot s^{-1}$. It is clear to see that e beam induced Pd heterogeneous nucleation forming Pd nanoparticles, which attached on the chiral nanowire surface.

Supplementary Movie 4

Description: Liquid-phase TEM movie of in DI water with the presence of Pd precursor with the addition of ascorbic acid as reducing agent after 5 min imaging. The movie is played at 15 times faster than real time. The electron dose rate was 8.5 $e \cdot Å^{-2} \cdot s^{-1}$. It is clear to see that e beam induced Pd homogeneous nucleation forming **Pd nanoparticles and bubbles**, which covered the AuAg BCB nanowire leading to **a great challenge** for in-situ TEM imaging.

Supplementary Movie 5

Description: **Atomic resolution** 3D visualization of AuAg BCB@Pd double helical core-shell nanowire after 3D HRSTEM reconstruction and surface generation. The electron dose rate was 7.5 $e \cdot Å^{-2} \cdot s^{-1}$. Note: the case is a product of Pd deposition on **chiral** seed nanowire.

Supplementary Movie 6

Description: Atomic resolution 3D visualization of AuAg BCB@Au **double helical nanowire** after 3D HRSTEM reconstruction and surface generation. The electron dose rate was 7.5 $e \cdot Å^{-2} \cdot s^{-1}$. Note: the case is a product of Au deposition on **chiral** seed nanowire.

Supplementary Movie 7

Description: 3D visualization of AuAg@Pd core-shell **straight nanowire** after 3D reconstruction **in nanoscale** and surface generation to show the rough surface due to Pd nanoparticle attachment and coalescence. Note: the case is a product of Pd deposition on **non-chiral** seed nanowire.

Supplementary Movie 8

Description: Liquid-phase TEM movie of AuAg BCB nanowire in DI water with the presence of Pd nanoparticle **coalescence** on **chiral** AuAg seed nanowire. The movie is played at 15 times faster than real time. The electron dose rate was 8.5 $e \cdot Å^{-2} \cdot s^{-1}$. It is clear to see that e beam induced Pd heterogeneous nucleation forming Pd nanoparticles, which attached on t he chiral nanowire surface.

Supplementary Movie 9

Description: Liquid-phase TEM movie of the Pd nanoparticle Ostwald ripening in colloids (Pd coating on AuAg BCB nanowire). The movie is played at 10 times faster than real time. T he electron dose rate was 8.4 $e \cdot Å^{-2} \cdot s^{-1}$. Note: the case is a product of Pd deposition on **n on-chiral** seed nanowire.