Electronic Supplementary Material (ESI) for New Journal of Chemistry.

1. Movie Captions

Movie S1: the growth trajectory of the Pt-Ni-oxide core-shell nanoparticles in the precursor solution with Pt:Ni=1:1.25. The movie plays twelve times faster than real time. The dose rate during the data collection is about 3320 e/Å^2·s.

Movie S2: the dynamic structural evolution during the growth of Pt-Ni-oxide core-shell nanoparticles in the precursor solution with Pt:Ni=1:1.25 at a high dose rate. The movie plays twelve times faster than real time. The dose rate during the data collection is about 4900 e/Å^2·s.

Movie S3: the dynamic facet transformation of NiO nanocrystal from {100} facet to {110} facet via Ni nanoparticle with {100} facet as intermediate in the precursor solution with Pt:Ni=1:1.25. The movie plays six times faster than real time. The dose rate during the data collection is about 4900 e/Å^2·s.

Movie S4: the formation of new interface structure of Pt_3Ni-Ni nanoparticles in the precursor solution with Pt:Ni=1:1.25. The movie plays three times faster than real time. The dose rate during the data collection is about 6873 e/Å^2·s.

Movie S5: the growth trajectory of Pt_3Ni nanowires in the precursor solution with Pt:Ni=2.5:1 at low dose rate. The movie plays twelve times faster than real time. The dose rate during the data collection is about 2520 e/Å^2·s.

Movie S6: the growth trajectory of Pt_3Ni nanowires in the precursor solution with Pt:Ni=2.5:1 at low dose rate. The movie plays twelve times faster than real time. The dose rate during the data collection is about 5000 e/Å^2·s.