

Description of Additional Supplementary Files

File Name: Supplementary Movie 1

Description: Dynamic transformation process from fcc to 4H Au at 300 kV with 1.0 mbar CO and dose rate of $2000 \text{ e } \text{\AA}^{-2} \text{ s}^{-1}$

File Name: Supplementary Movie 2

Description: AIMD with 1 CO and extra electrons

File Name: Supplementary Movie 3

Description: AIMD with 1 CO but no extra electrons

File Name: Supplementary Movie 4

Description: AIMD with extra electrons but no CO.

File Name: Supplementary Movie 5

Description: AIMD with neither extra electrons nor CO

File Name: Supplementary Movie 6

Description: Dynamic transformation process from fcc to 4H Au at 80 kV with 1.0 mbar CO and dose rate of $500 \text{ e } \text{\AA}^{-2} \text{ s}^{-1}$.

File Name: Supplementary Movie 7

Description: Size effect on the phase transformation process at 300 kV with 1.0 mbar CO and dose rate of $2000 \text{ e } \text{\AA}^{-2} \text{ s}^{-1}$.

File Name: Supplementary Movie 8

Description: Size effect of the phase transformation process at 80 kV with 1.0 mbar CO and dose rate of $500 \text{ e } \text{\AA}^{-2} \text{ s}^{-1}$.