# Supporting Information

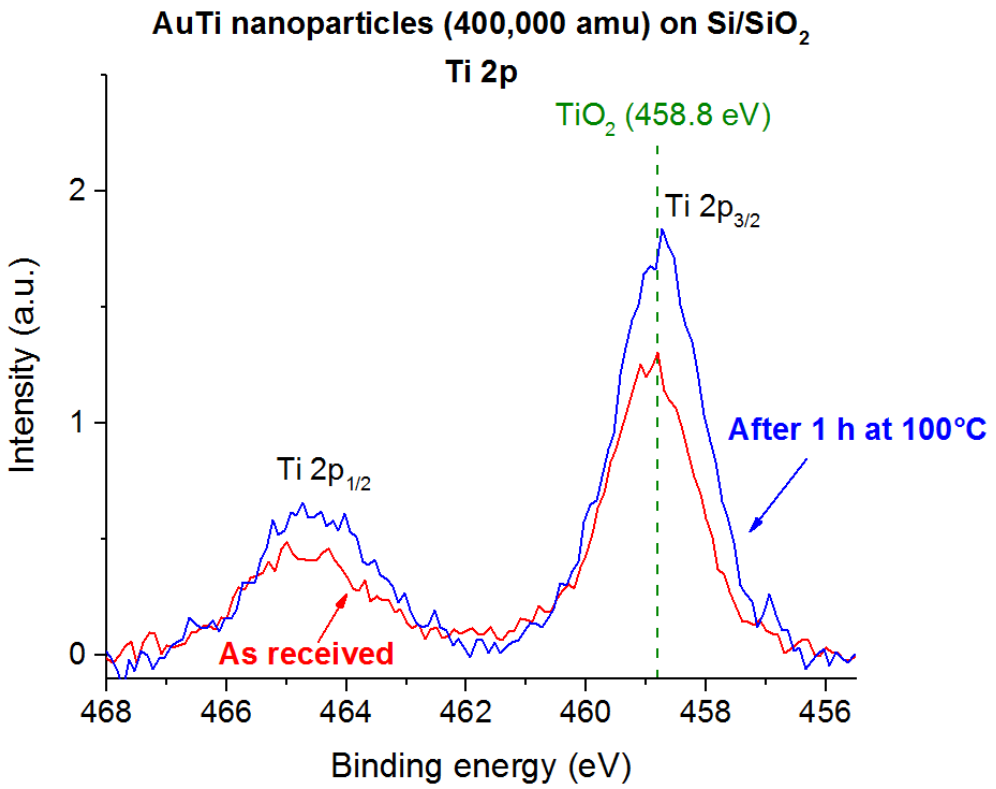


Figure S1: Detailed XPS spectra of of the Ti 2p region recorded before (A) and after (B) 100 ℃ for 1 h in 1 bar of $CO/O_2$ in case of the sample having Au/Ti mass-selected nanoclusters deposited. The spectra were shifted to give an Au $4f_{7/2}$ binding energy of 84 eV and were normalized with the area of the Si 2s peak.

In order to investigate the binding state of Ti on the surface detailed spectra of the Ti 2p region were recorded of the samples having Au/Ti nanoclusters on the surface (Figure S1). After transporting under atmospheric conditions the Ti is oxidized and present on the surface as $TiO_2$ which does not change after heating under a gas mixture of $O_2$ and CO. The relative amount of Ti compared to Si is increasing however. This could be the result of a segregation process and the enrichment of the outer layers of the clusters with Ti.

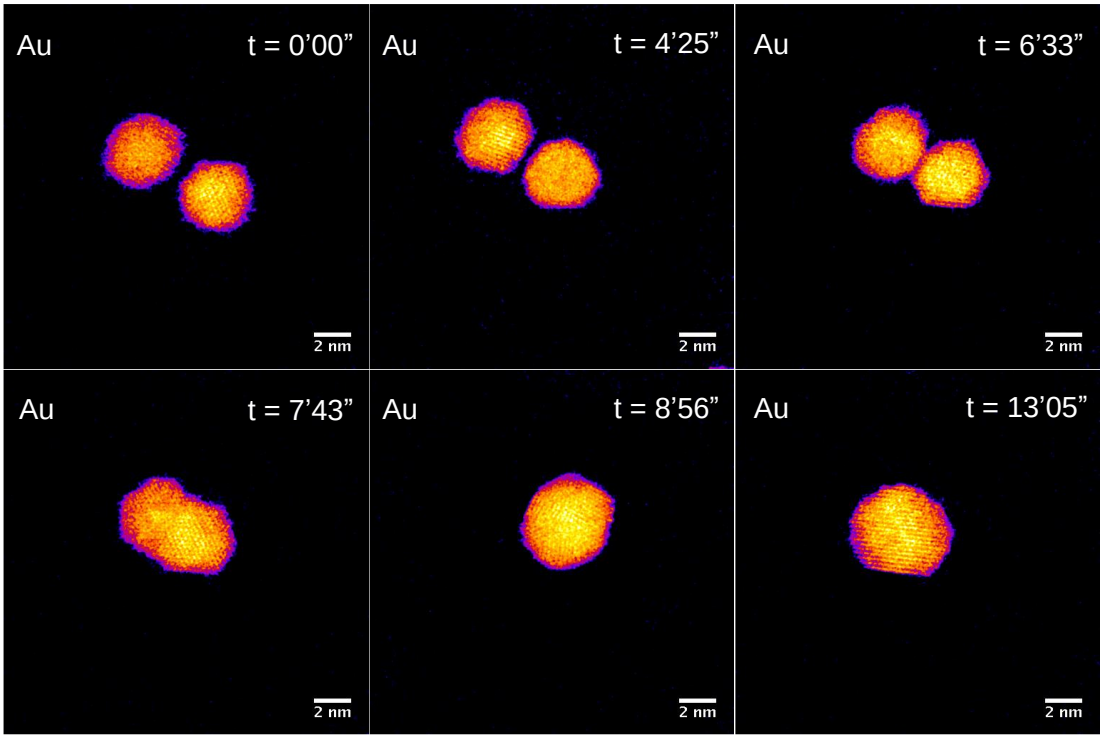


Figure S2: Sintering process of $Au_{2057}$ dimer continuously exposed to electron beam irradiation with acquisition time of 1.3 seconds per frame and a dose of 6.3 $\times 10^3$ $e^-$ per Angstrom$^2$ per frame. At the beginning of imaging, the gap size is ~0.75 nm.

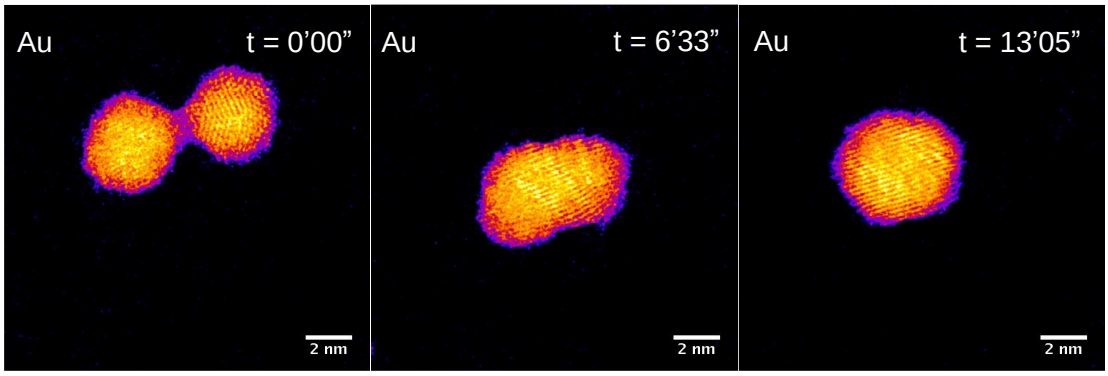


Figure S3: Sintering process of $Au_{2057}$ dimer continuously exposed to electron beam irradiation with acquisition time of 1.3 seconds per frame and a dose of 9.8 $\times 10^3$ $e^-$ per Angstrom$^2$ per frame. The two clusters are already connected with each other at the beginning, and quickly coalesce into one cluster.

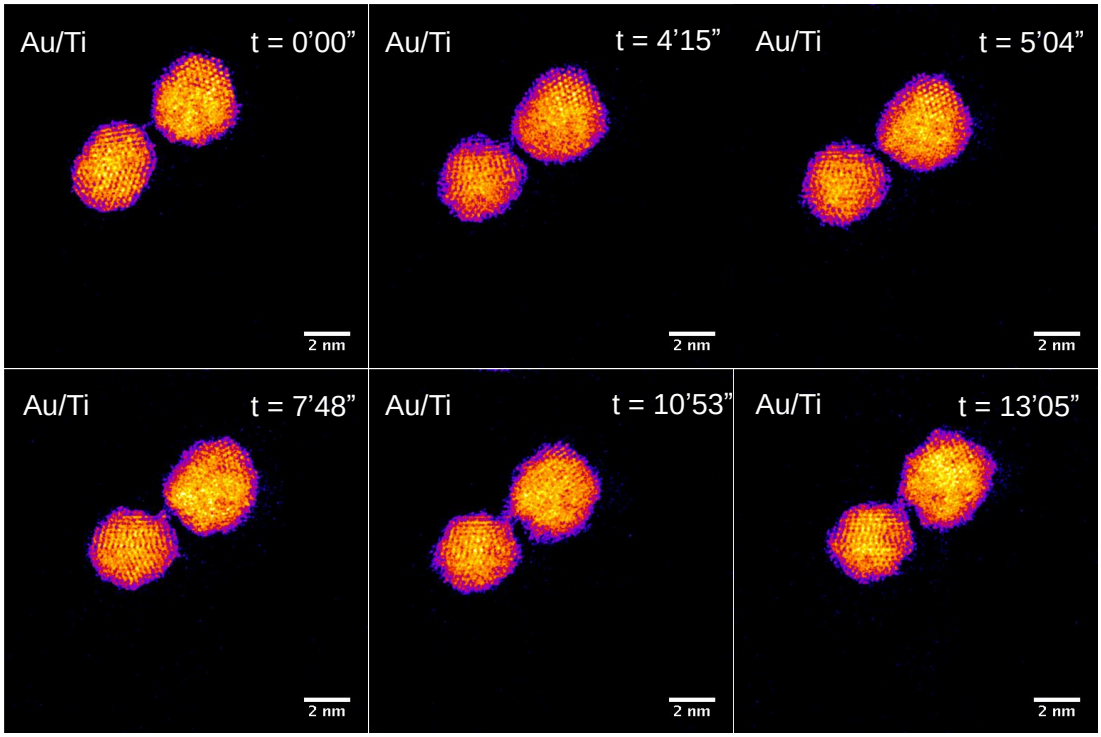


Figure S4: STEM images of Au/Ti (400k amu) cluster dimer continuously exposed to electron beam irradiation with acquisition time of 1.3 seconds per frame and a dose of 9.8 $\times 10^3$ $e^-$ per Angstrom$^2$ per frame. The gap size is ~0.60 nm at the beginning of imaging.

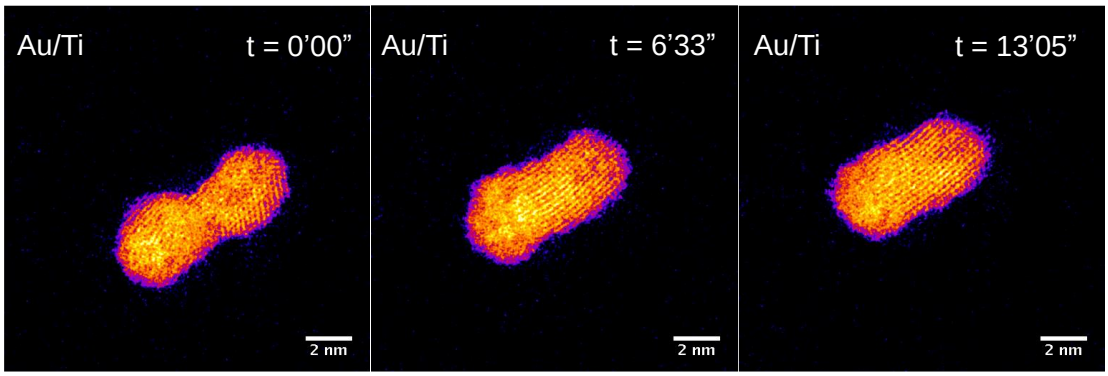


Figure S5: STEM images of Au/Ti (400k amu) cluster dimer with two connected clusters continuously exposed to electron beam irradiation with acquisition time of 1.3 seconds per frame and a dose of 9.8 $\times 10^3$ $e^-$ per Angstrom$^2$ per frame.