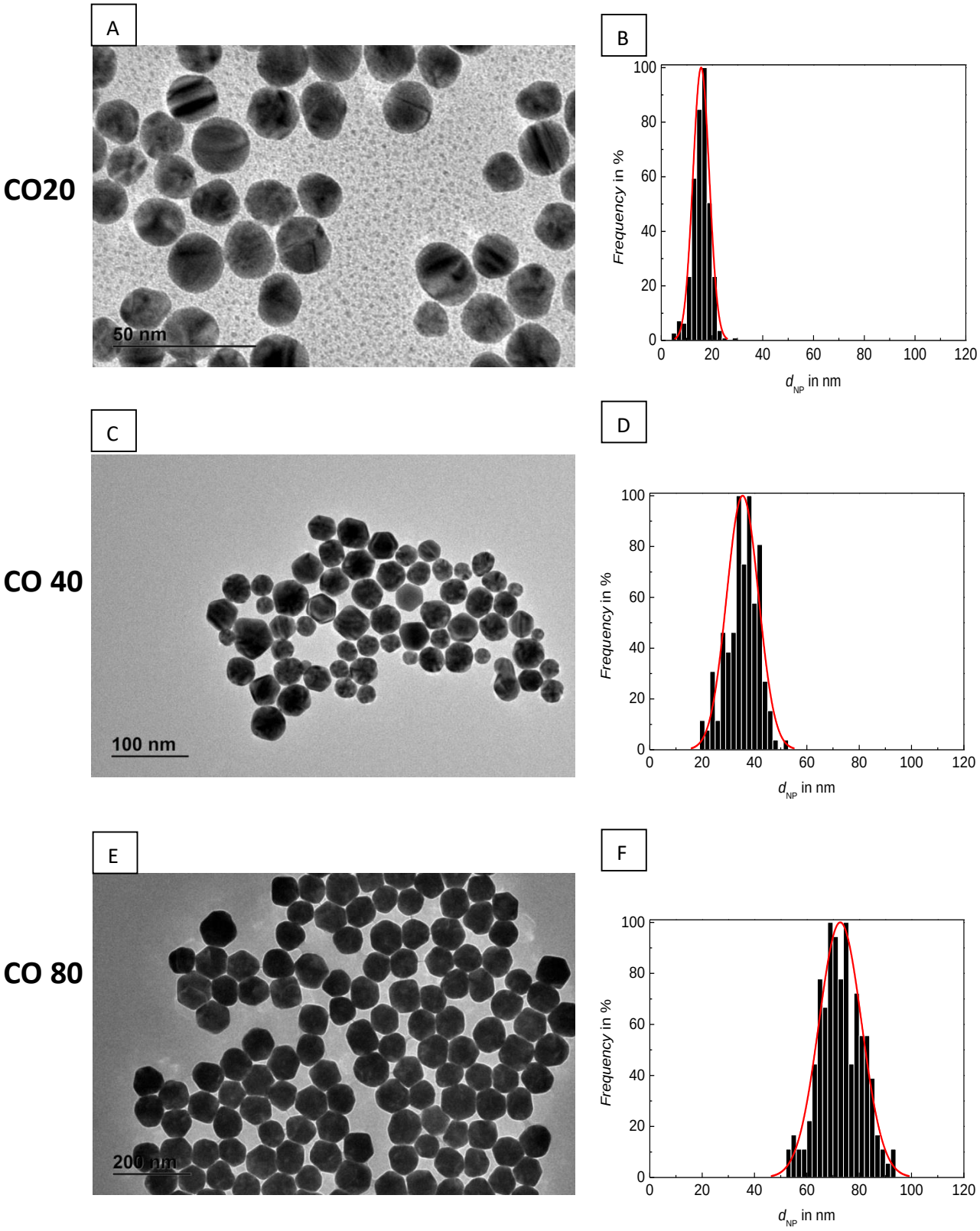


Figure S1a: HR-TEM images and quantitative particle size distribution analysis of (A-B) CO20 ; (C-D) CO40 ; and (E-F) CO80 gold NPs.

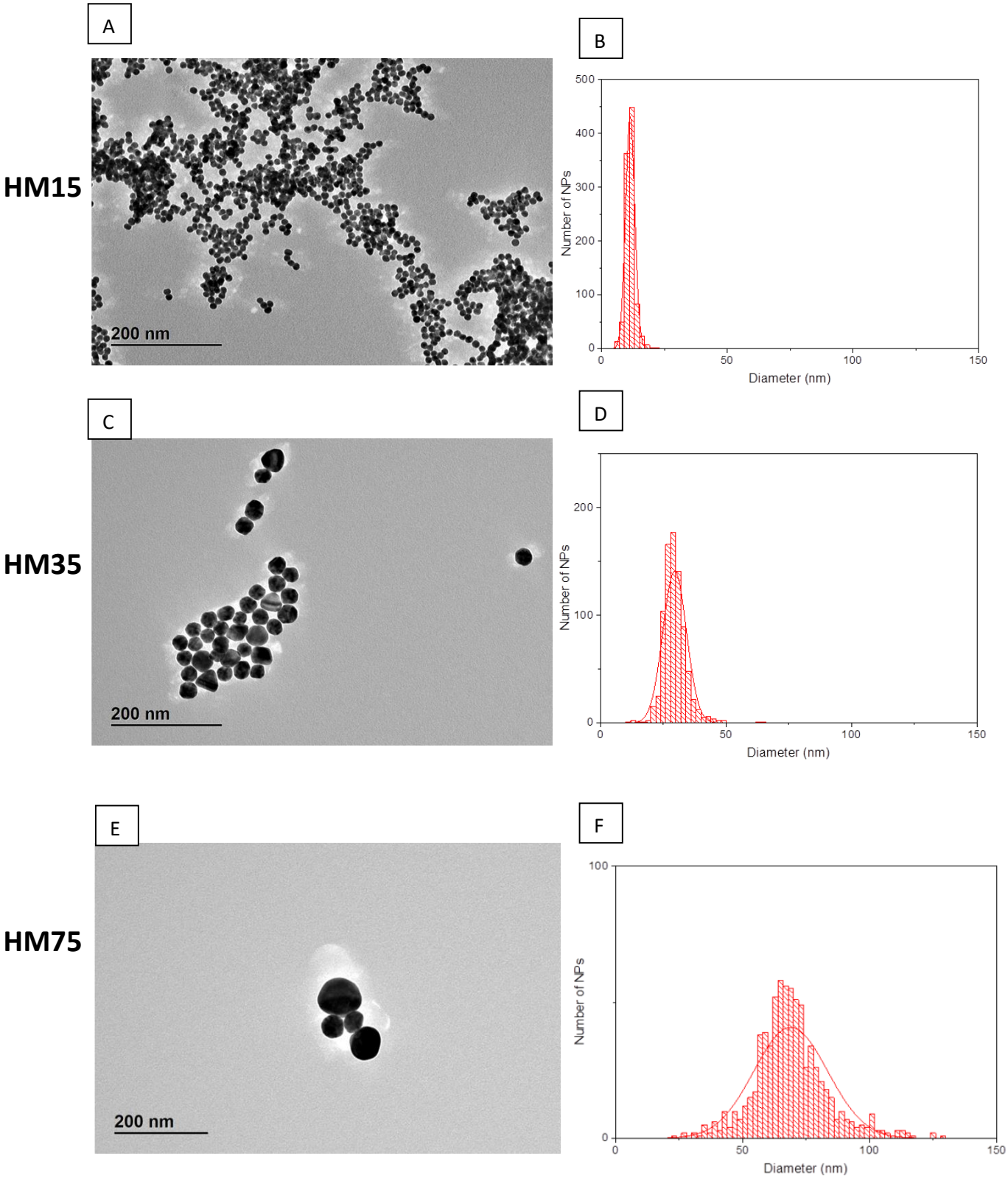
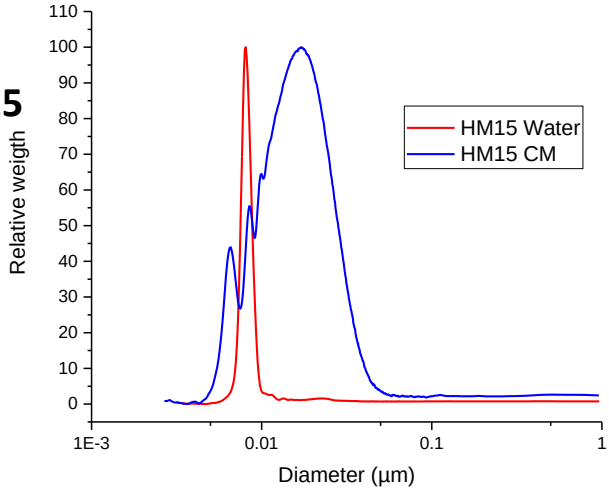
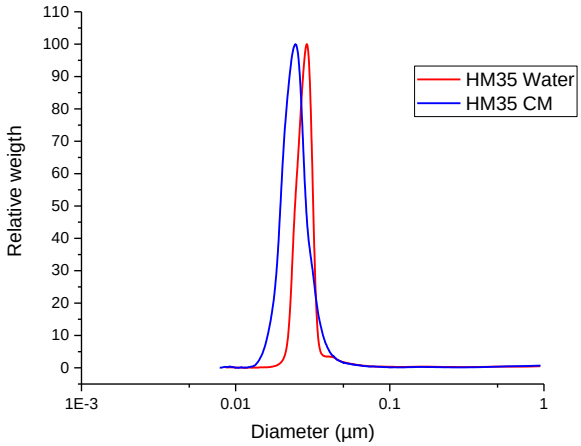


Figure S1b: HR-TEM image and quantitative particle size distribution analysis of (A-B) HM15 ; (C-D) HM35 ; and (E-F) HM75 gold NPs.

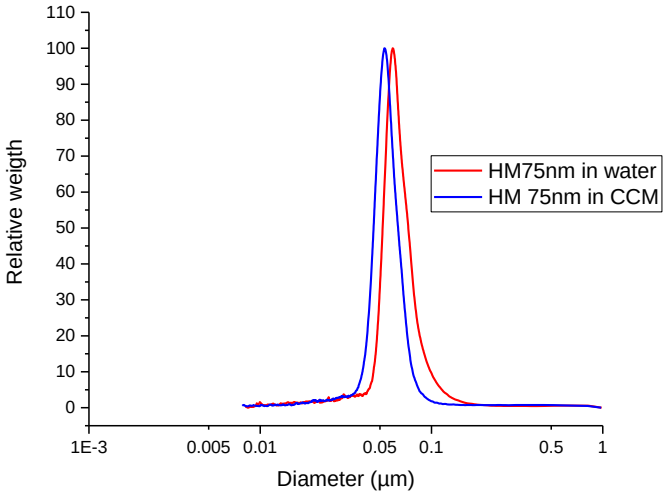
HM15



HM35

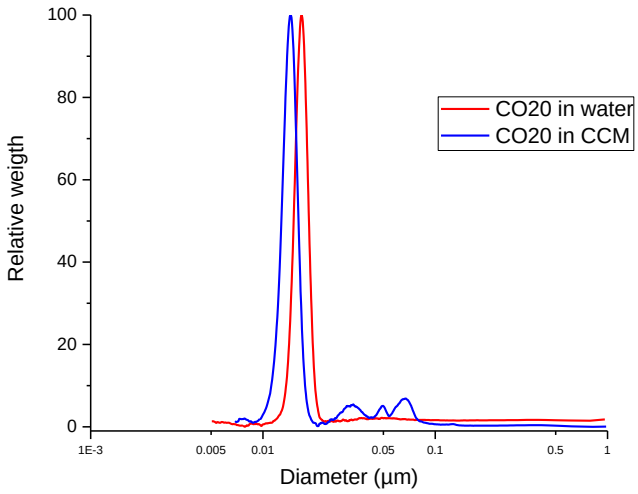


HM75

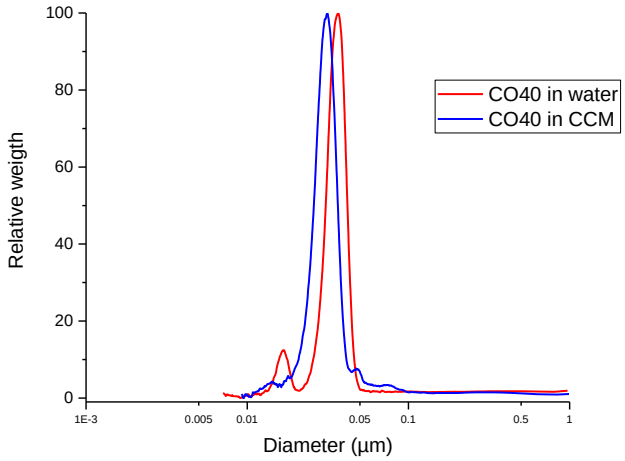


S2a : CLS size distribution intensity curves. HM series

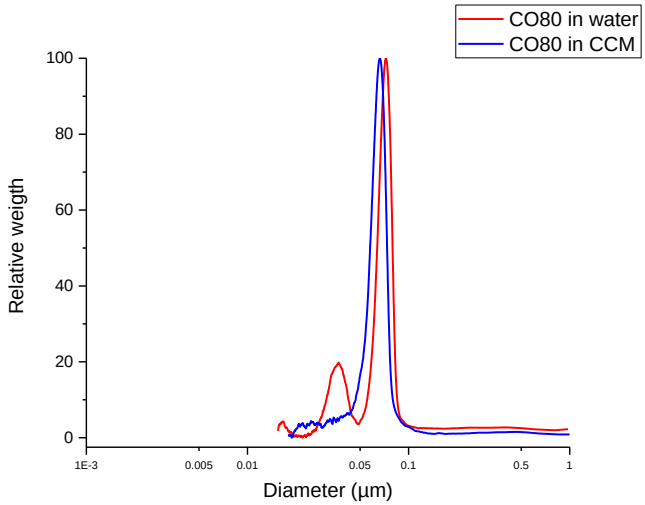
CO20



CO40

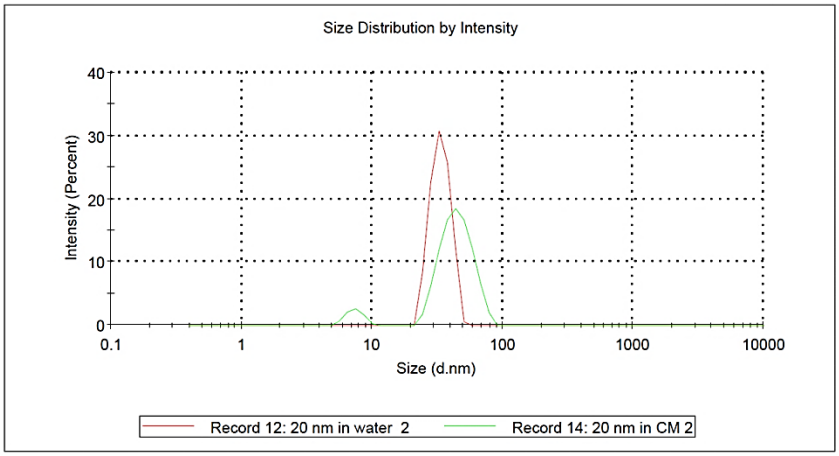


CO80

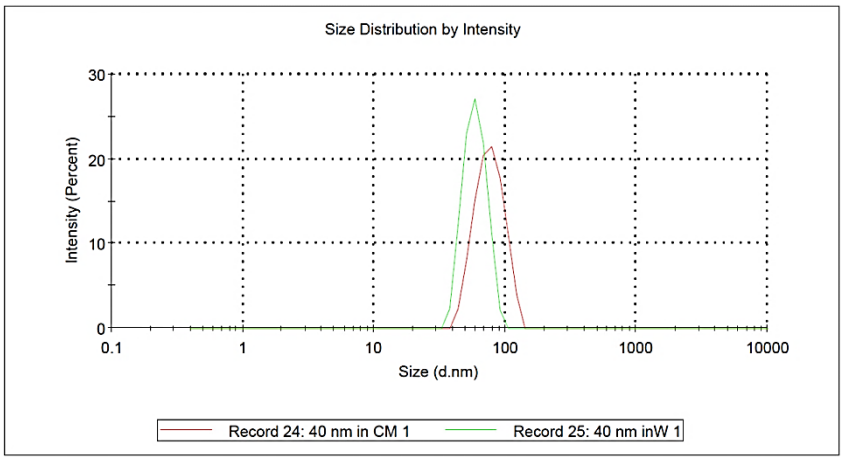


S2b: CLS size distribution intensity curves. CO series

CO20



CO40



CO80

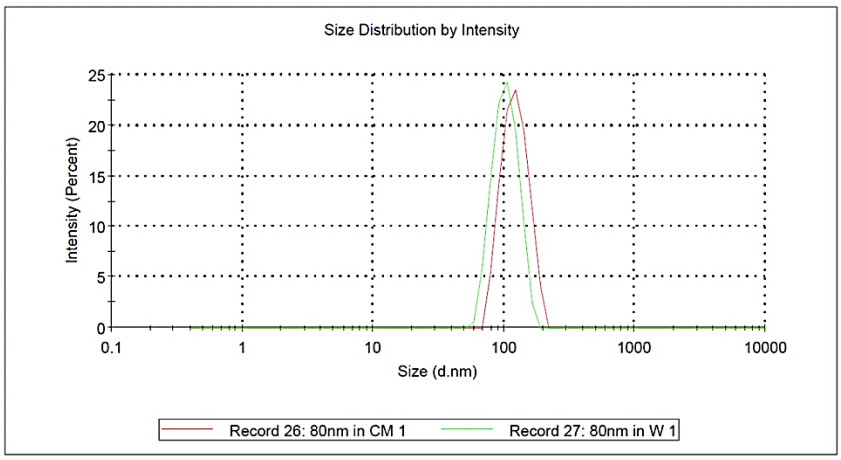
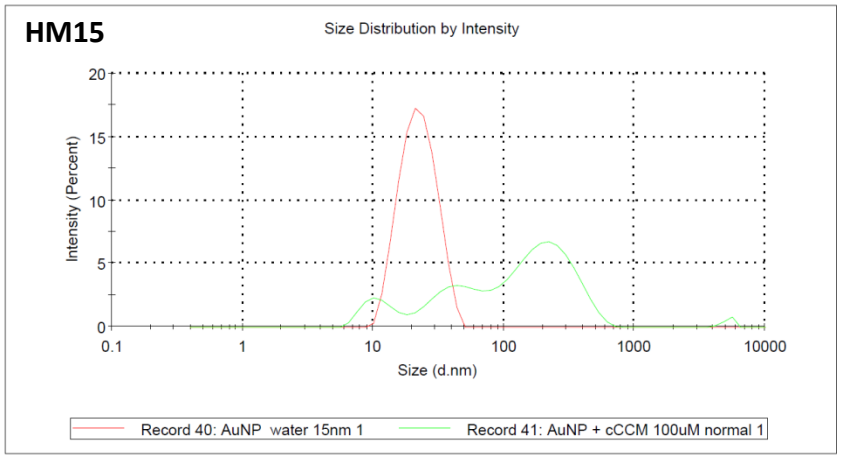
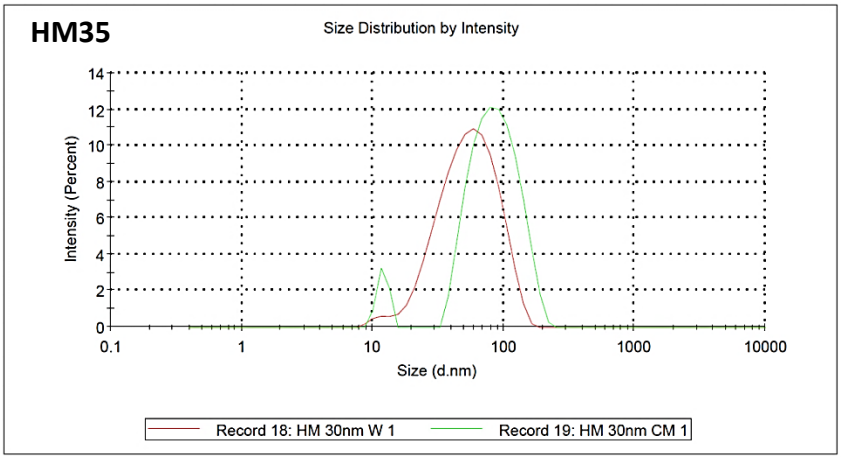


Figure S3a: DLS size distribution intensity curves for the two sets of particles in water and CCM. CO series





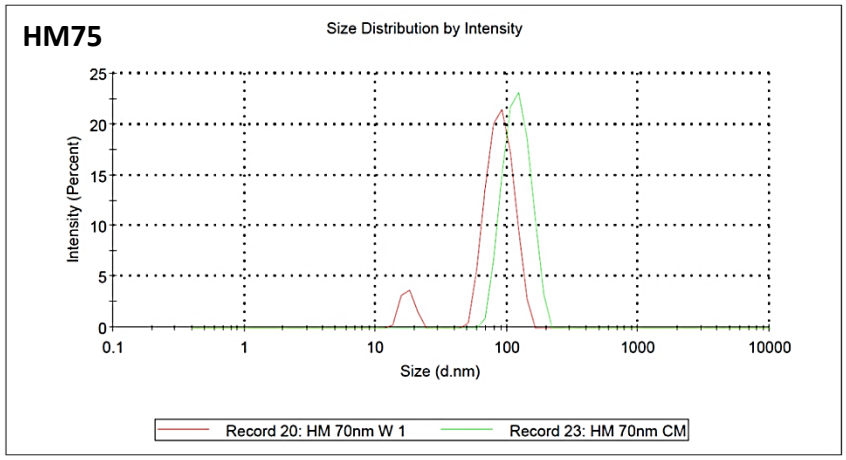
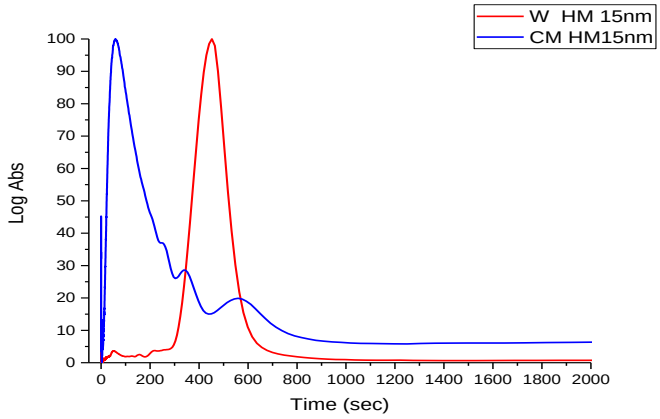
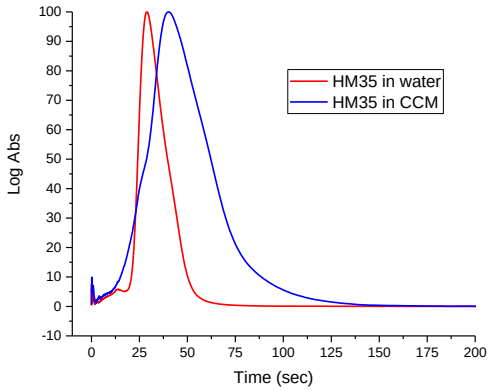


Figure S3b: DLS size distribution intensity curves for the two sets of particles in water and CCM. HM series





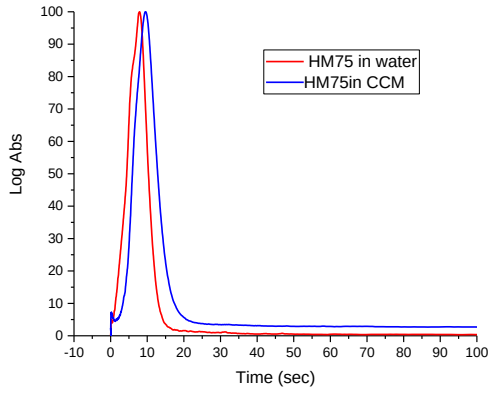
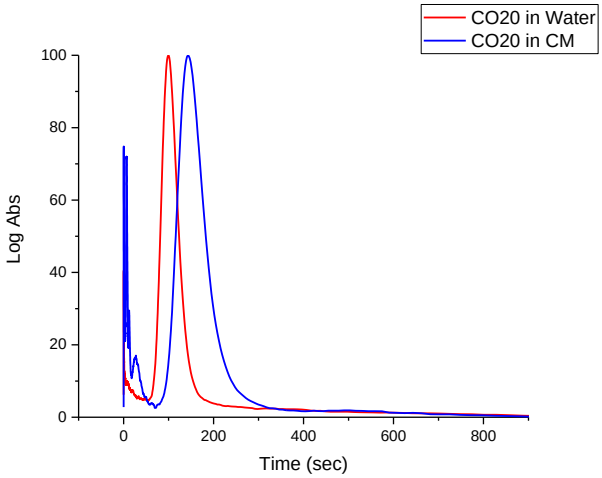
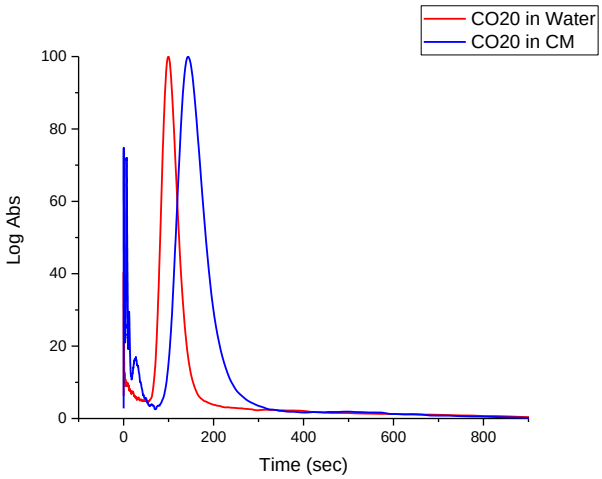


Figure S4a, : CLS sedimentation times for HM set of NPs in water and CCM.





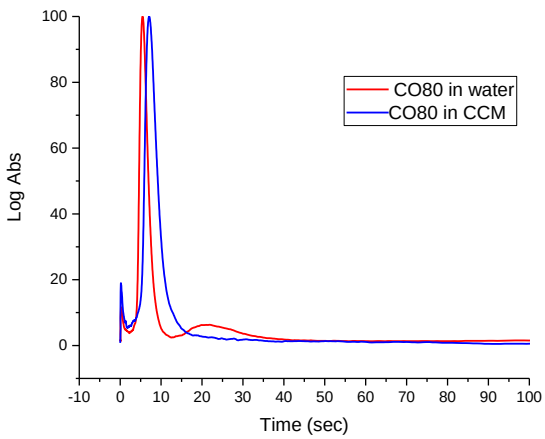
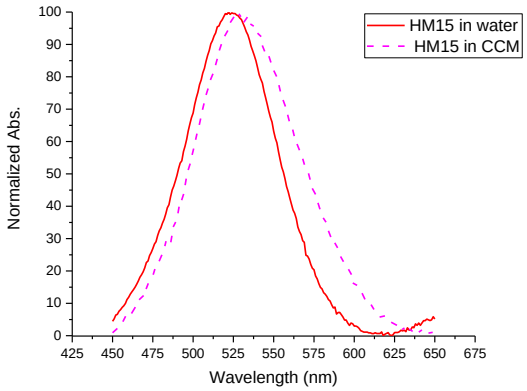
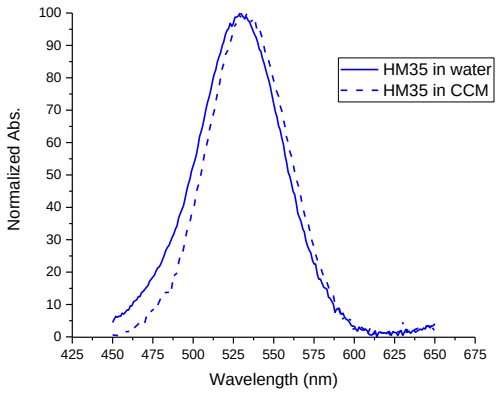


Figure S4b : CLS sedimentation times for CO set of NPs in water and CCM





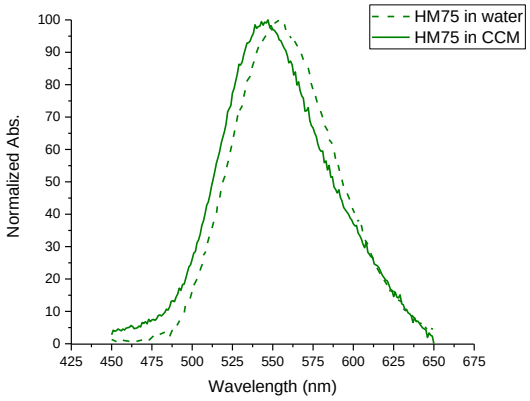
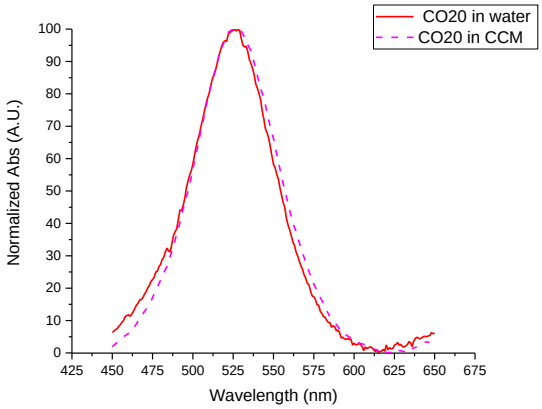
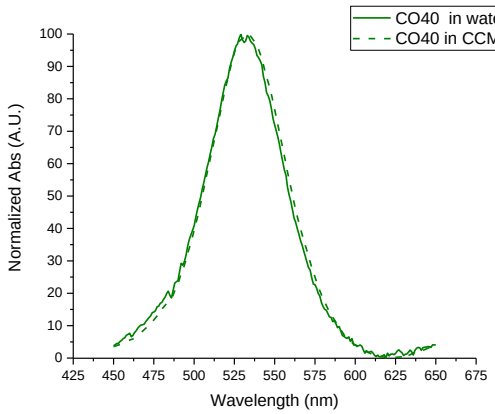


Figure S5a: UV-*vis* absorbance spectra of the HM set of NPs measured in water and CCM.





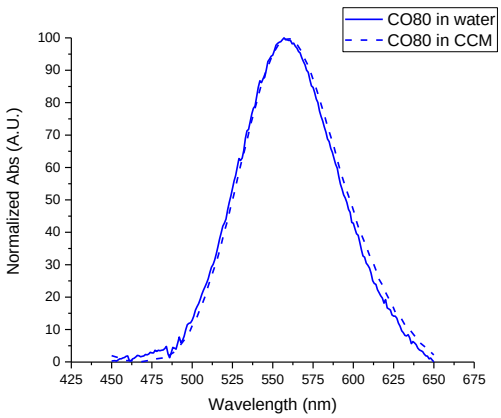


Figure S5b : UV-*vis* absorbance spectra of the CO set of NPs measured in water and CCM

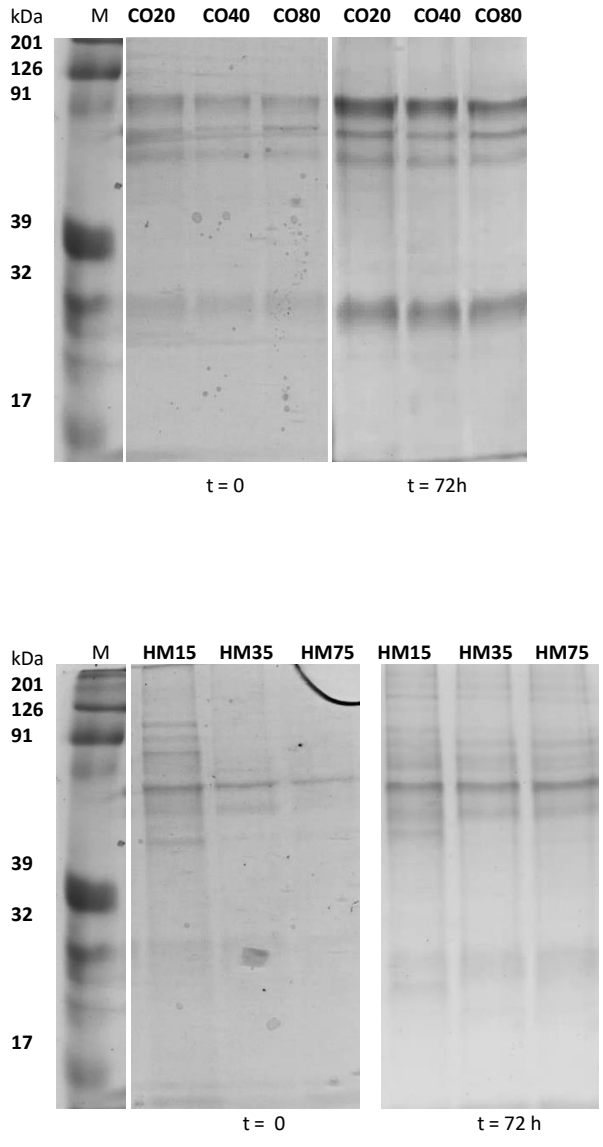
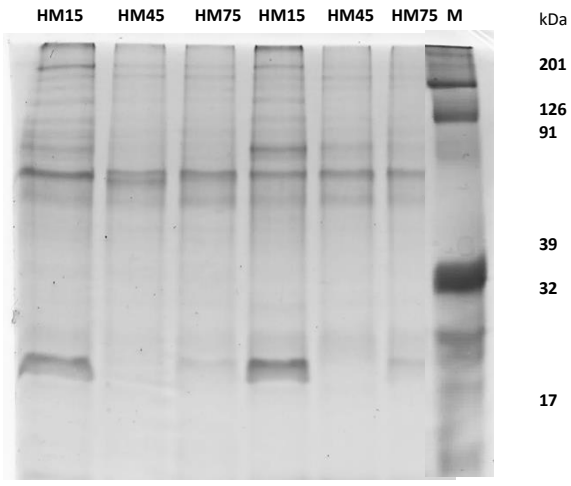


Figure S6 : SDS page images of protein corona isolated from CO and HM series NPs at t = 0 and t = 72 hours.



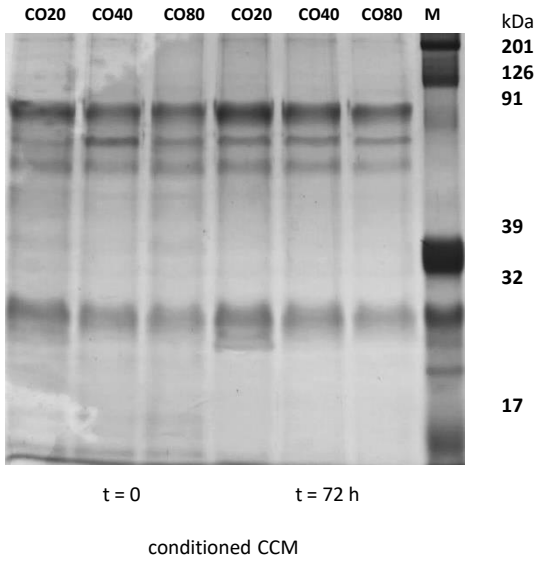


Figure S7 : SDS page images of protein corona isolated from CO and HM series NPs at t = 0 and t = 72 hours. Cell culture medium was conditioned with A549 for 72 hours.

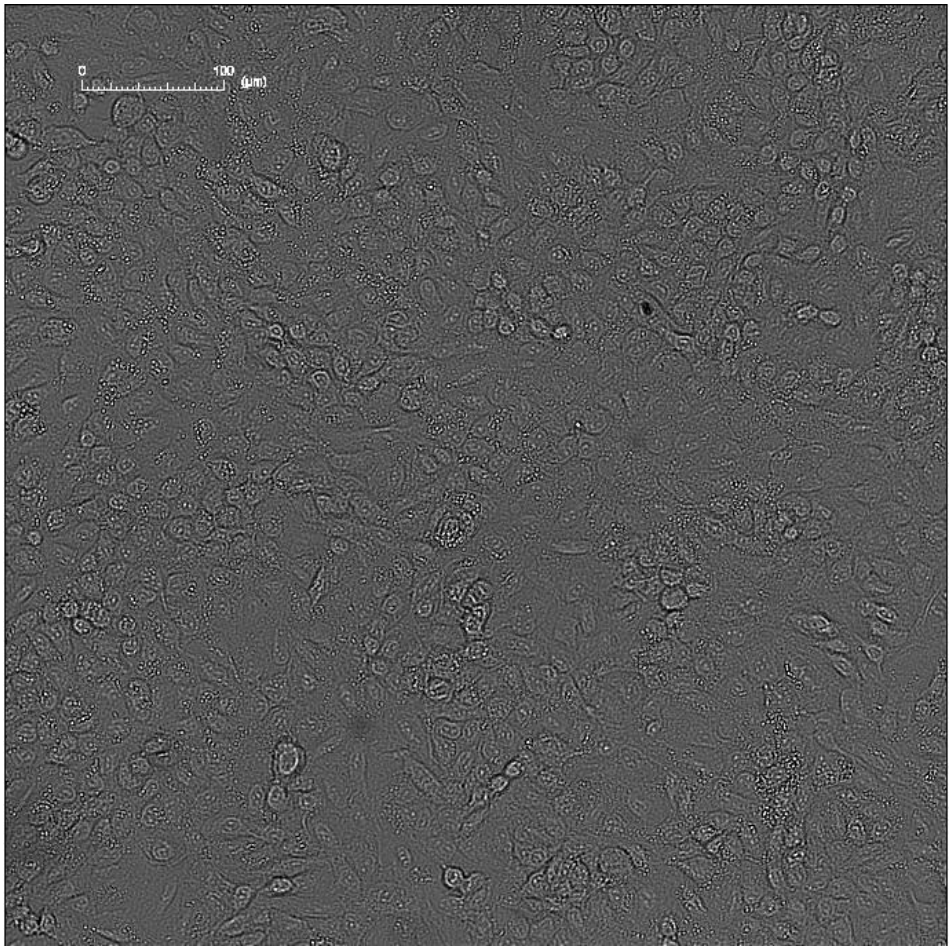


Figure S8 a: bright field image of A549 cell culture

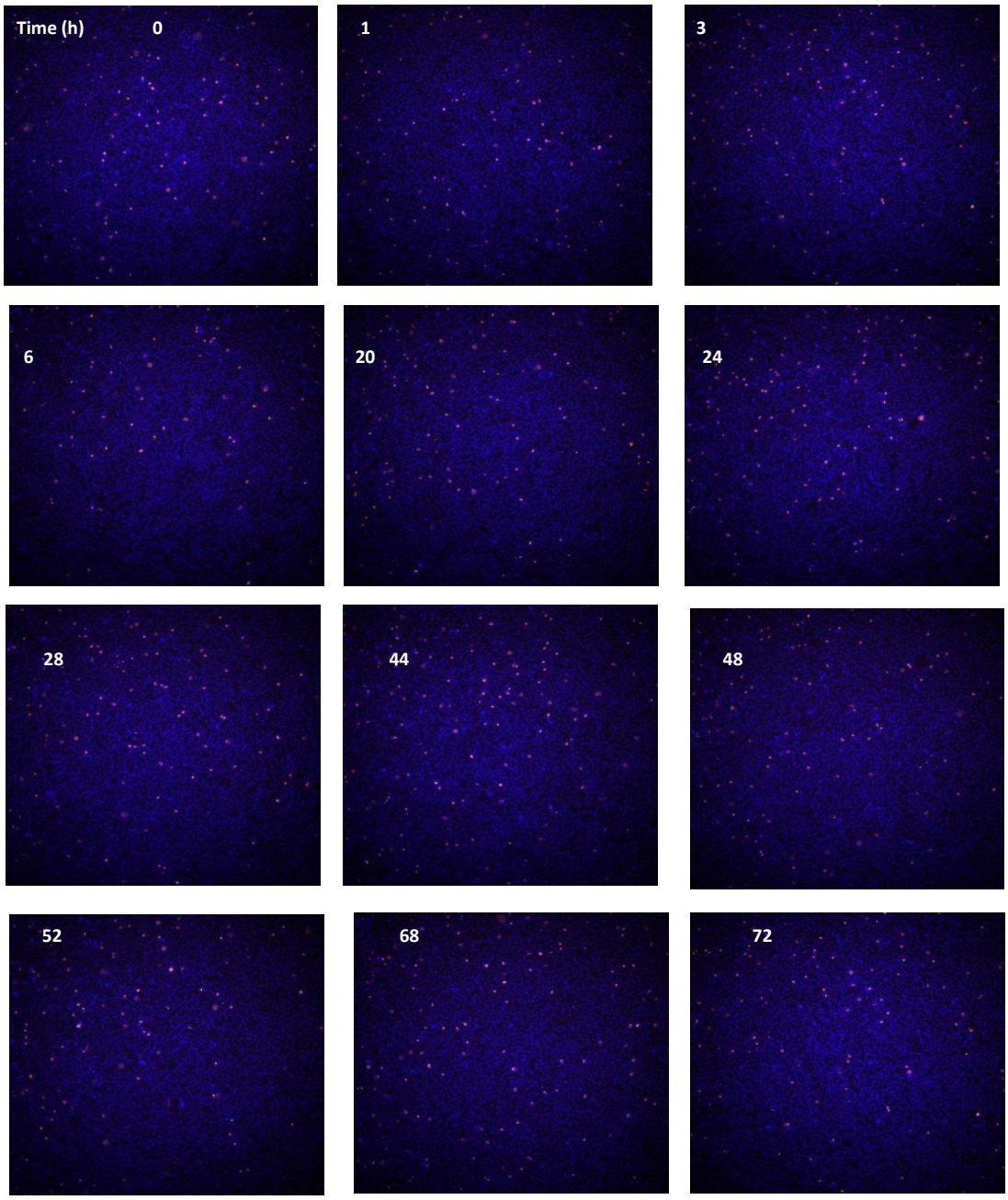


Fig. S8 b: Fluorescence images of the cell monolayer stained by Hoechst/PI stained for viability and counting.

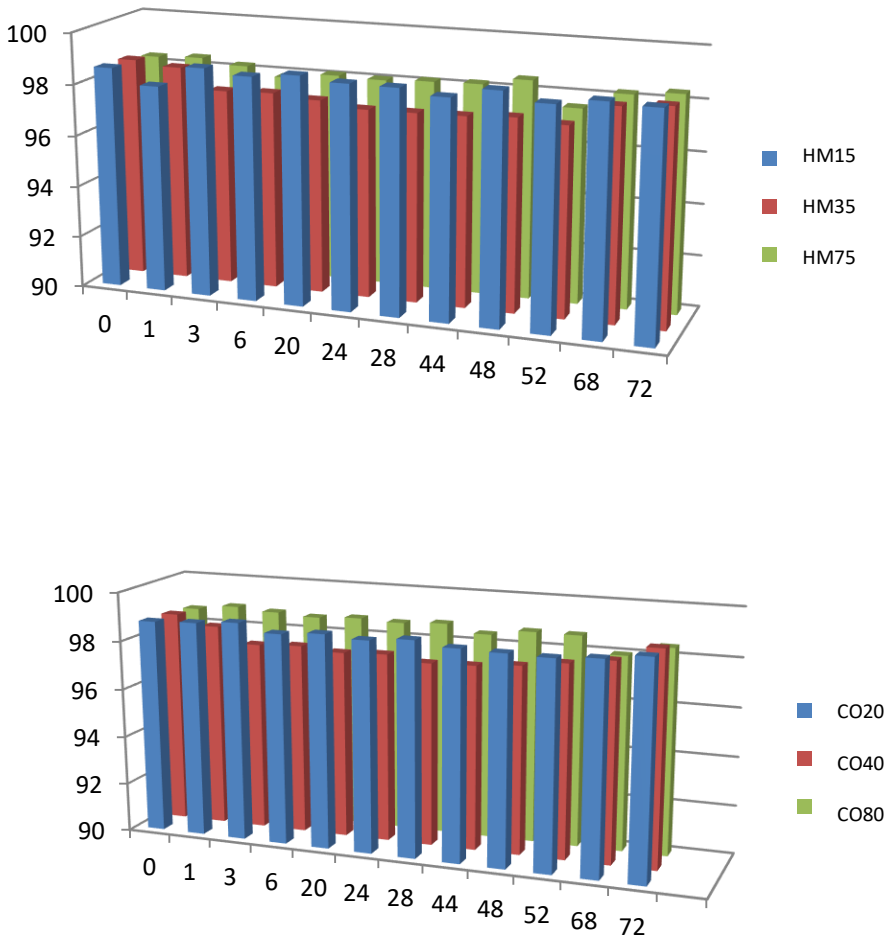


Fig. S8c. Cell monolayer integrity monitoring by statistical analysis of viability measurements of the cell monolayer exposed to different gold NPs. The ratio of living cells/ dead cells of the exposed A549 cells was analyzed with the IN Cell Analyzer 2200 in triplicates for each of the eleven time points.

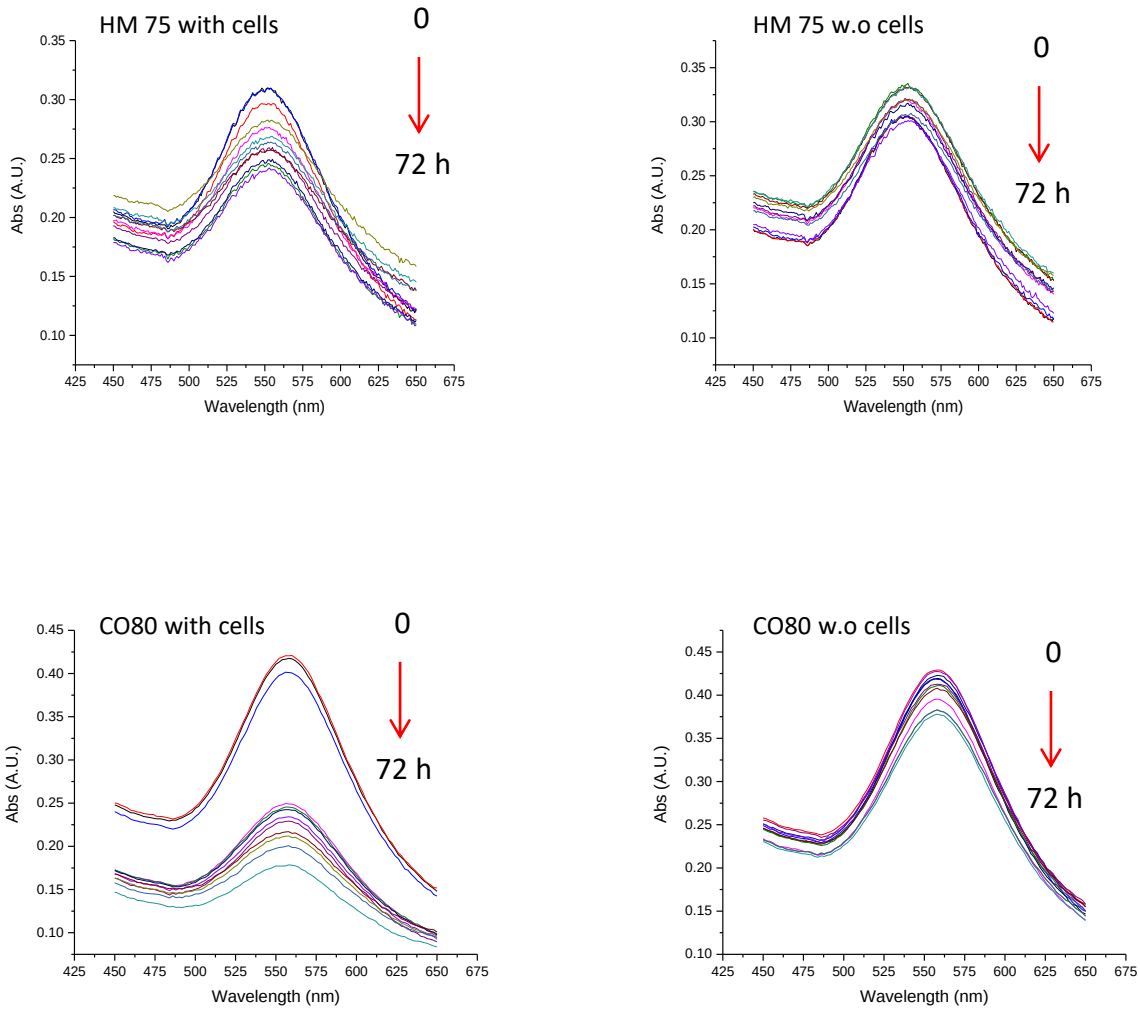
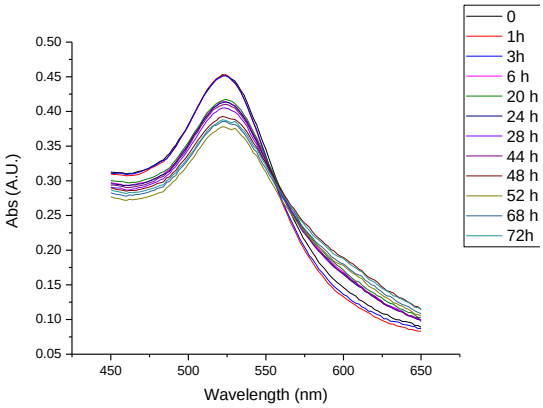
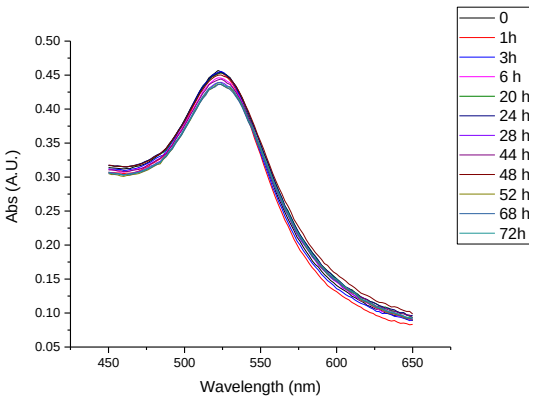


Figure S9a: Raw UV-*vis* spectra measured for the CO80 and HM75 in CCM at different time points.

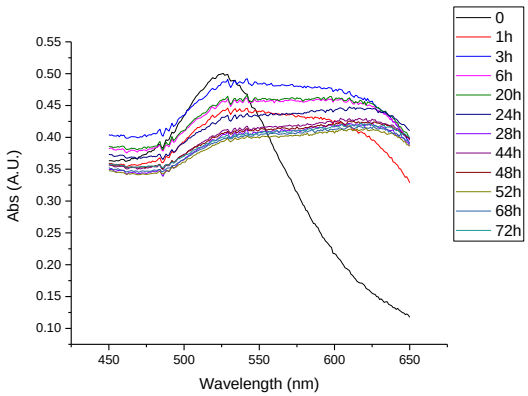
CO20 with Cells



CO20 without Cells



HM15 with Cells



HM15 without Cells

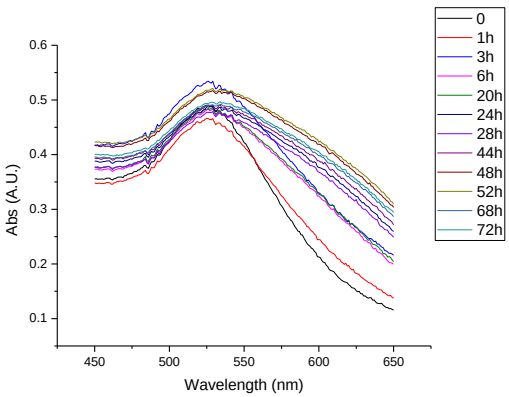
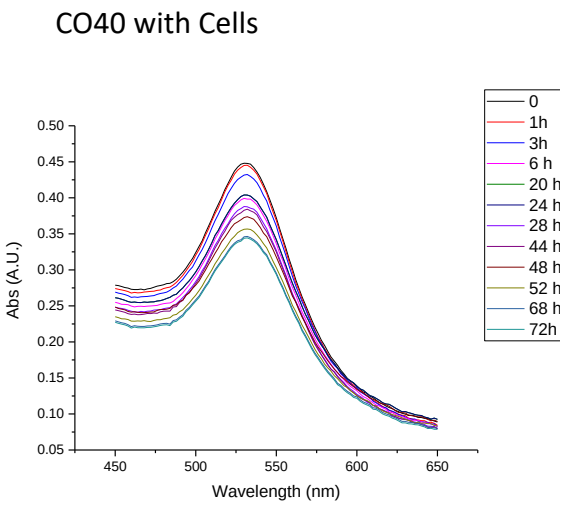
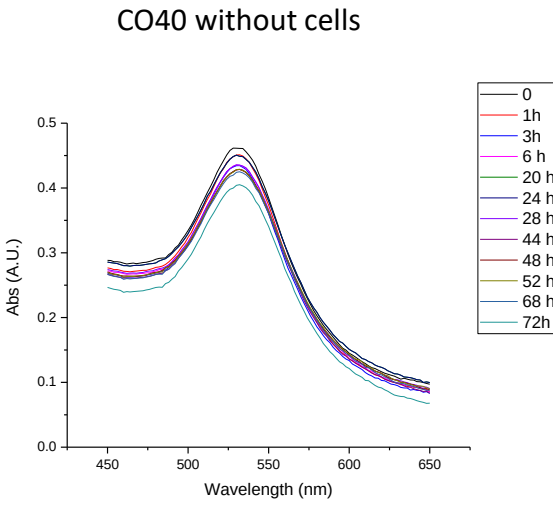
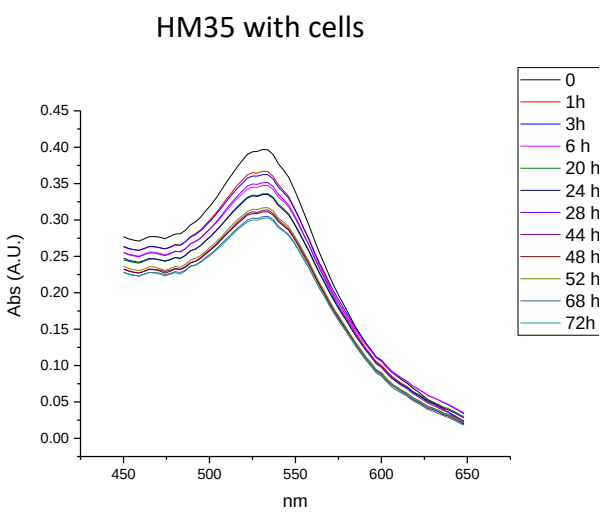


Figure S9b: Raw UV-*vis* spectra measured for the CO20 in CCM at different time points.







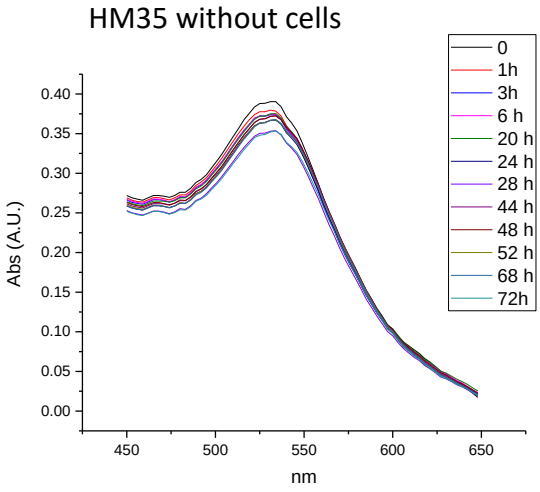


Figure S9c: Raw UV-*vis* spectra measured for the CO40 and HM35 in CCM at different time points.

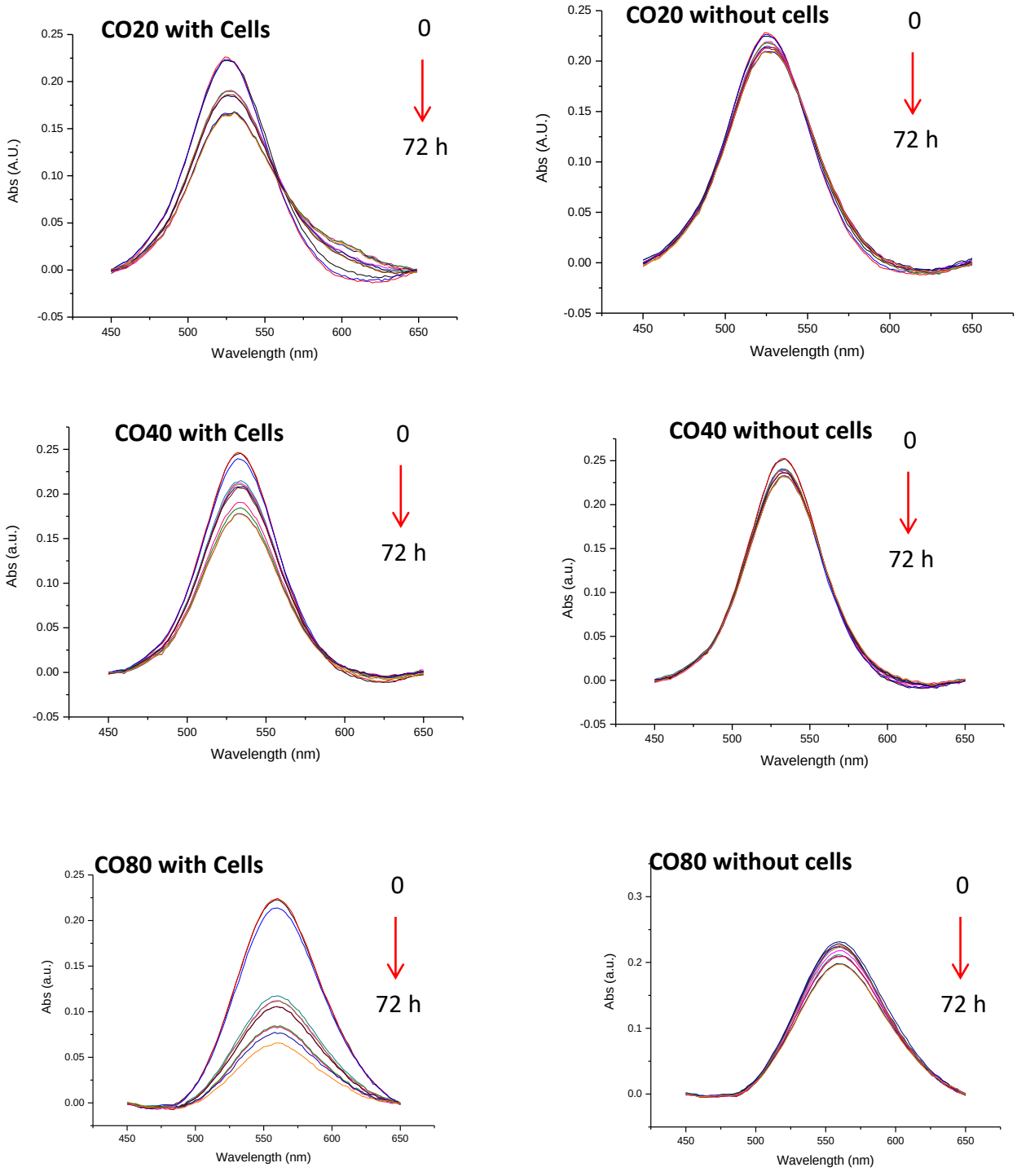
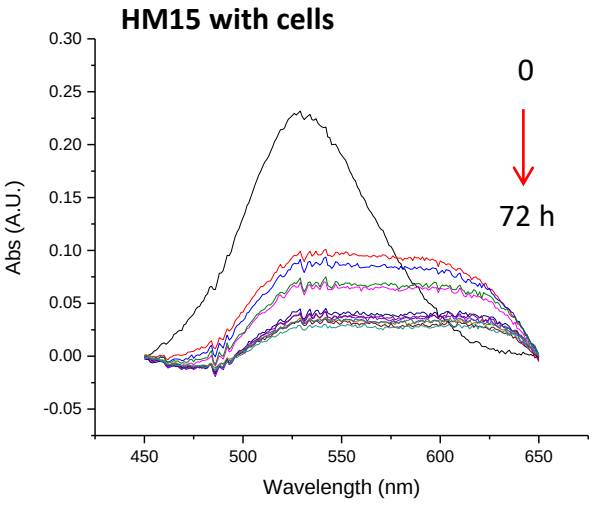
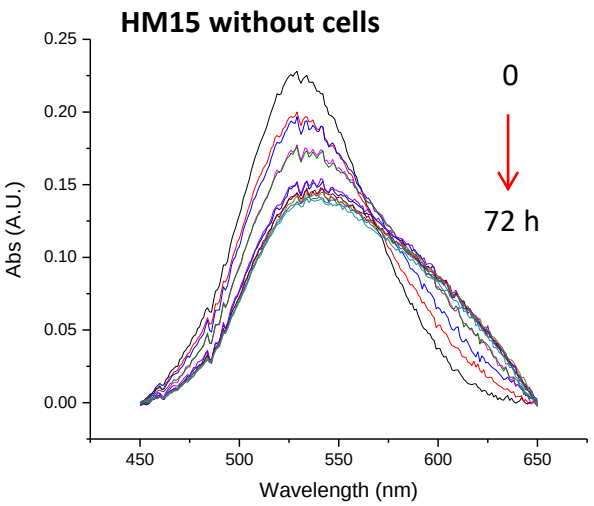
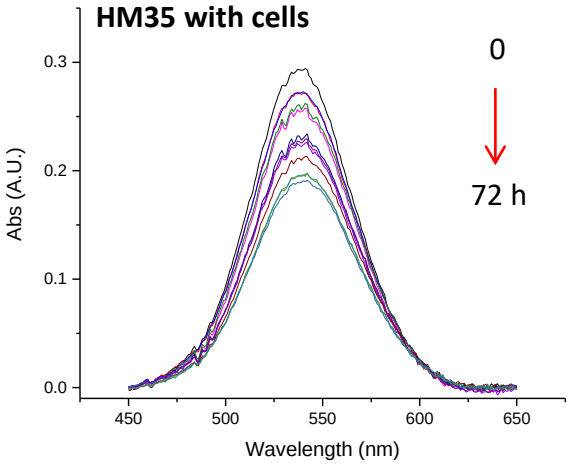
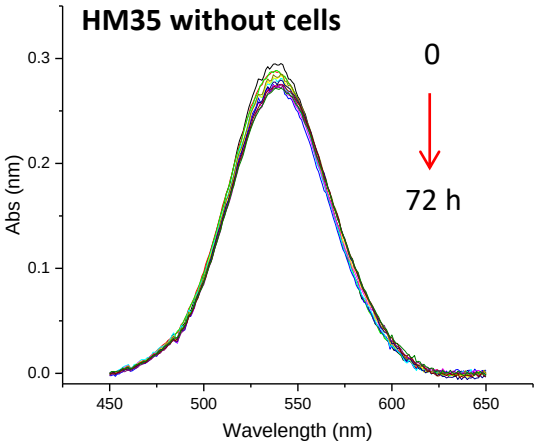


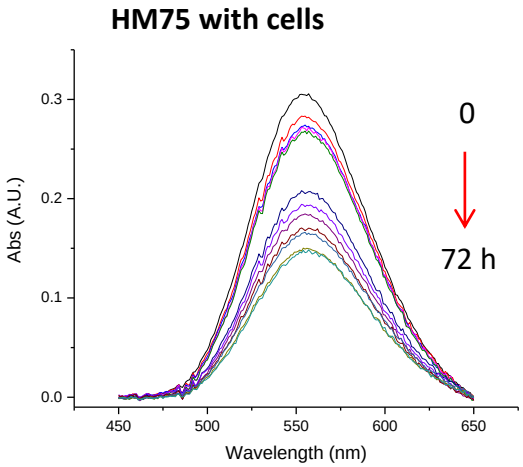
Fig S10a: UV-*vis* spectra measured for all Co NP sizes. Each time point spectrum is an average of three different samples measurements..











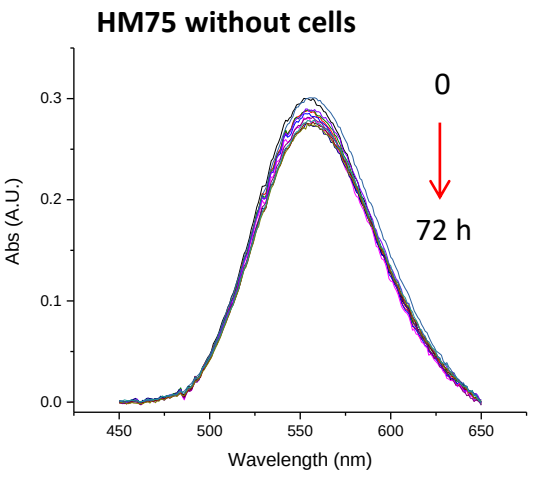
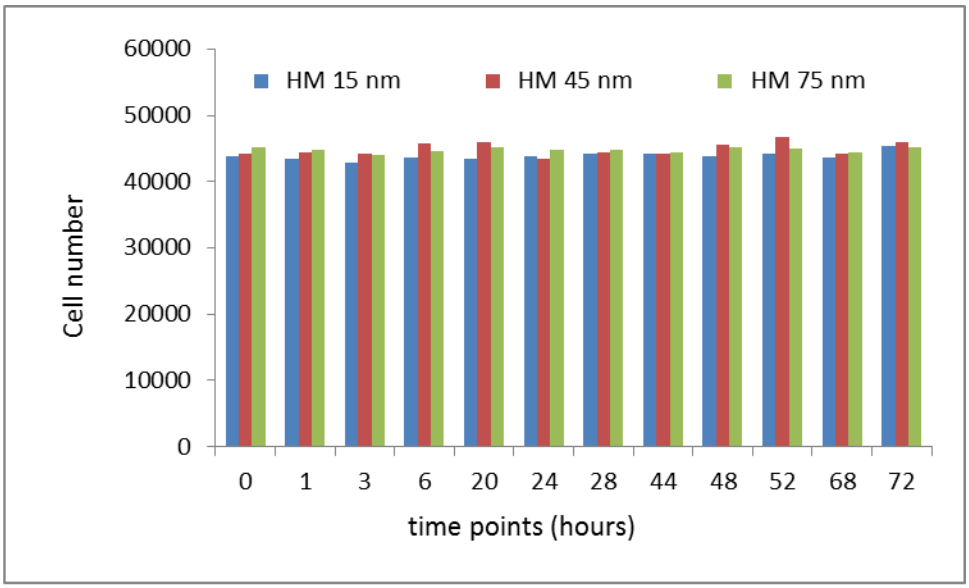


Fig S10b: UV-*vis* spectra measured for all HM NP sizes. Each time point spectrum is an average of three different samples measurements.



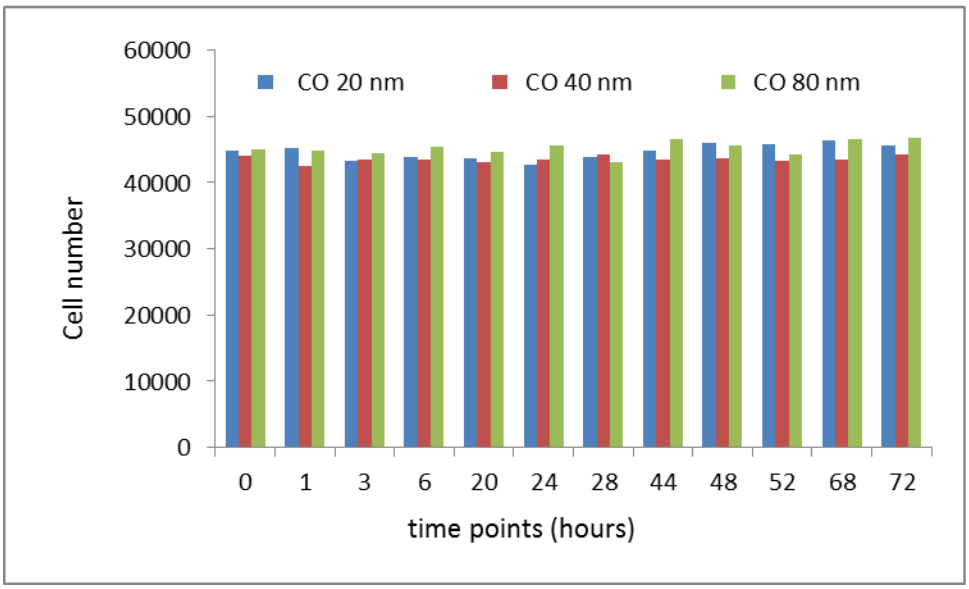


Fig. S11 Number of cells per well plotted versus time point counted in automatic with the IN Cell Analyser 2200 Imaging System of the Hoechst stained nuclei from a square area of the bottom of the 96 well.

S12. SEM and EDX analysis

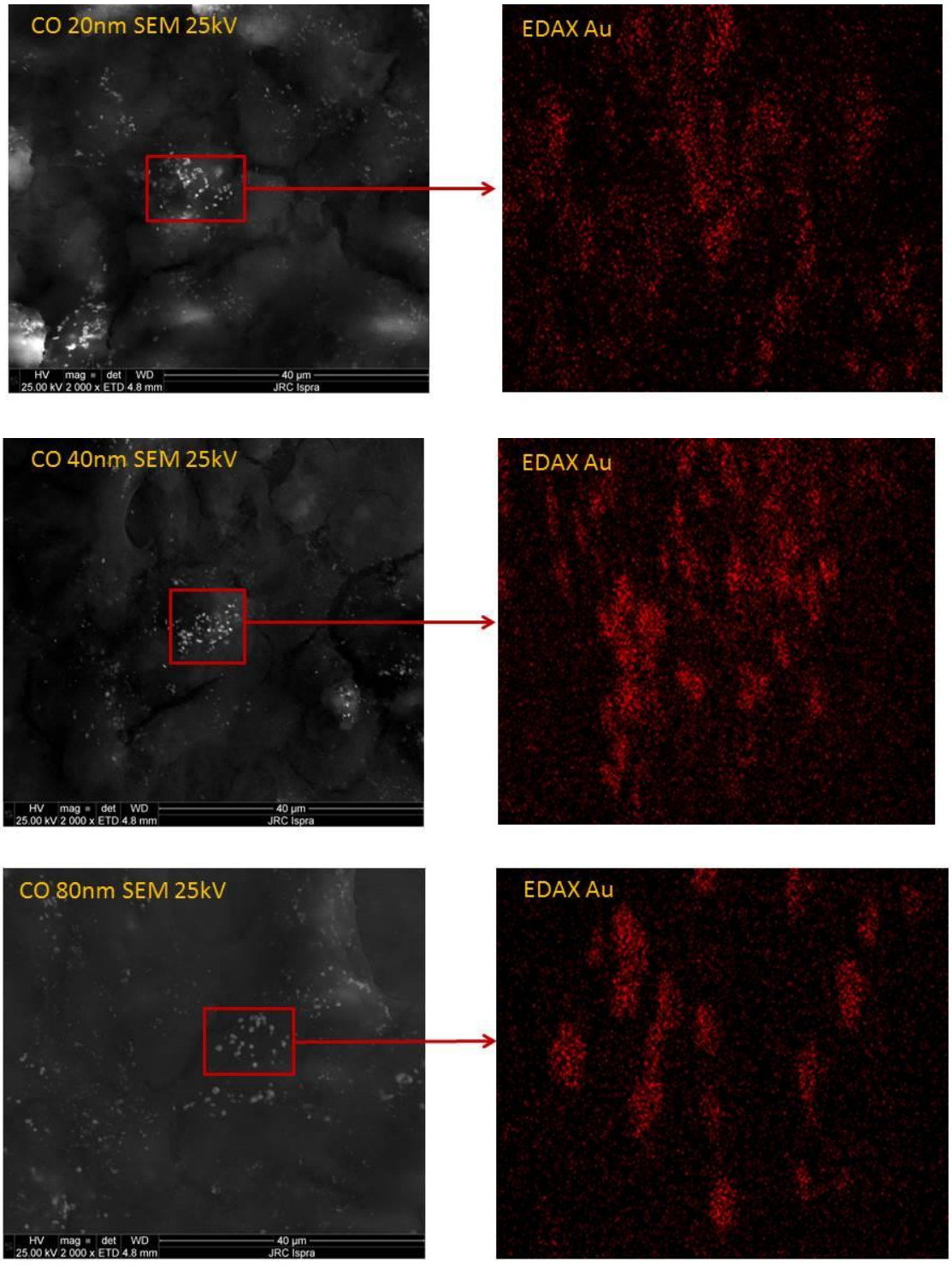


Fig. S12a. SEM picture on the A549 cells treated with different NP sizes on the left. On the right are the EDX – Au maps for gold NPs from the selected regions of the SEM pictures.

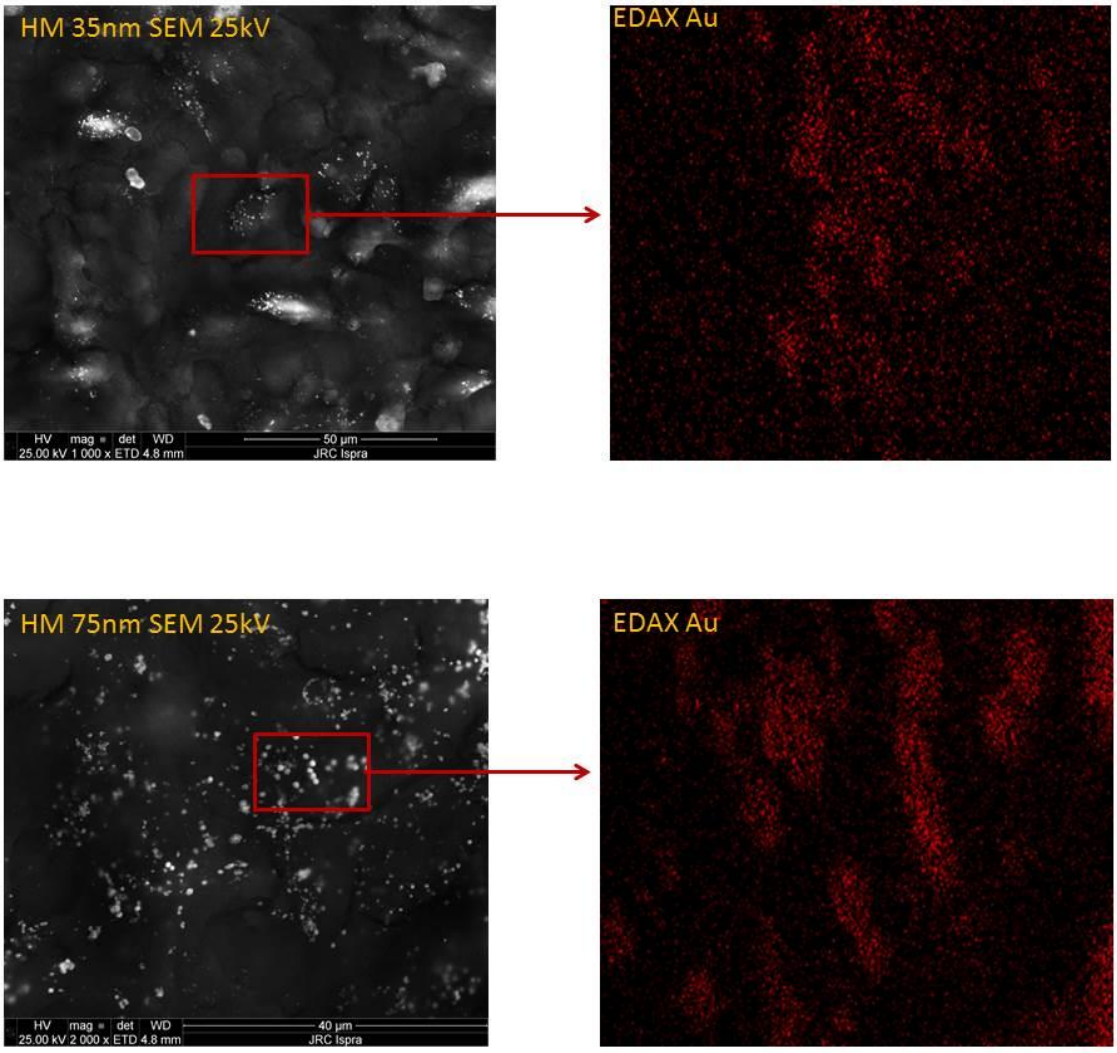


Fig. S12b. SEM picture on the A549 cells treated with different NP sizes on the left. On the right are the EDX – Au maps for gold NPs from the selected regions of the SEM pictures.