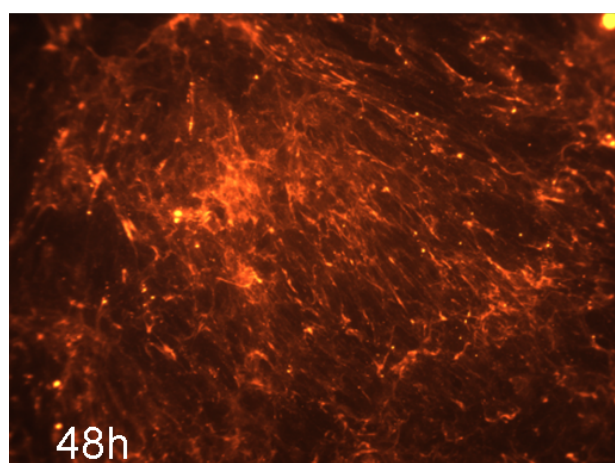
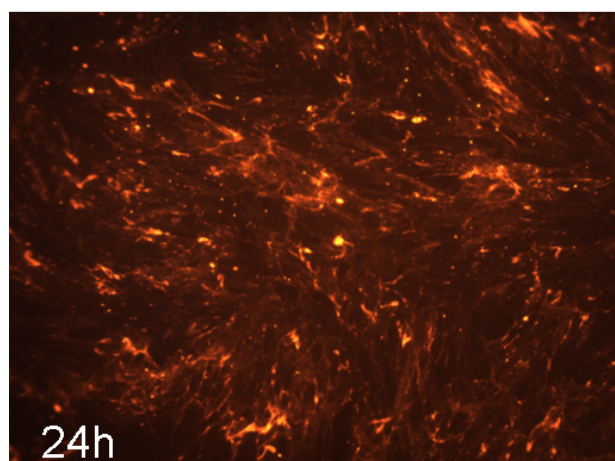
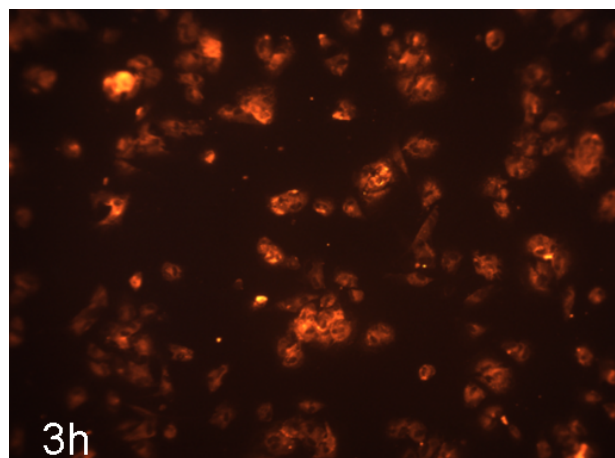
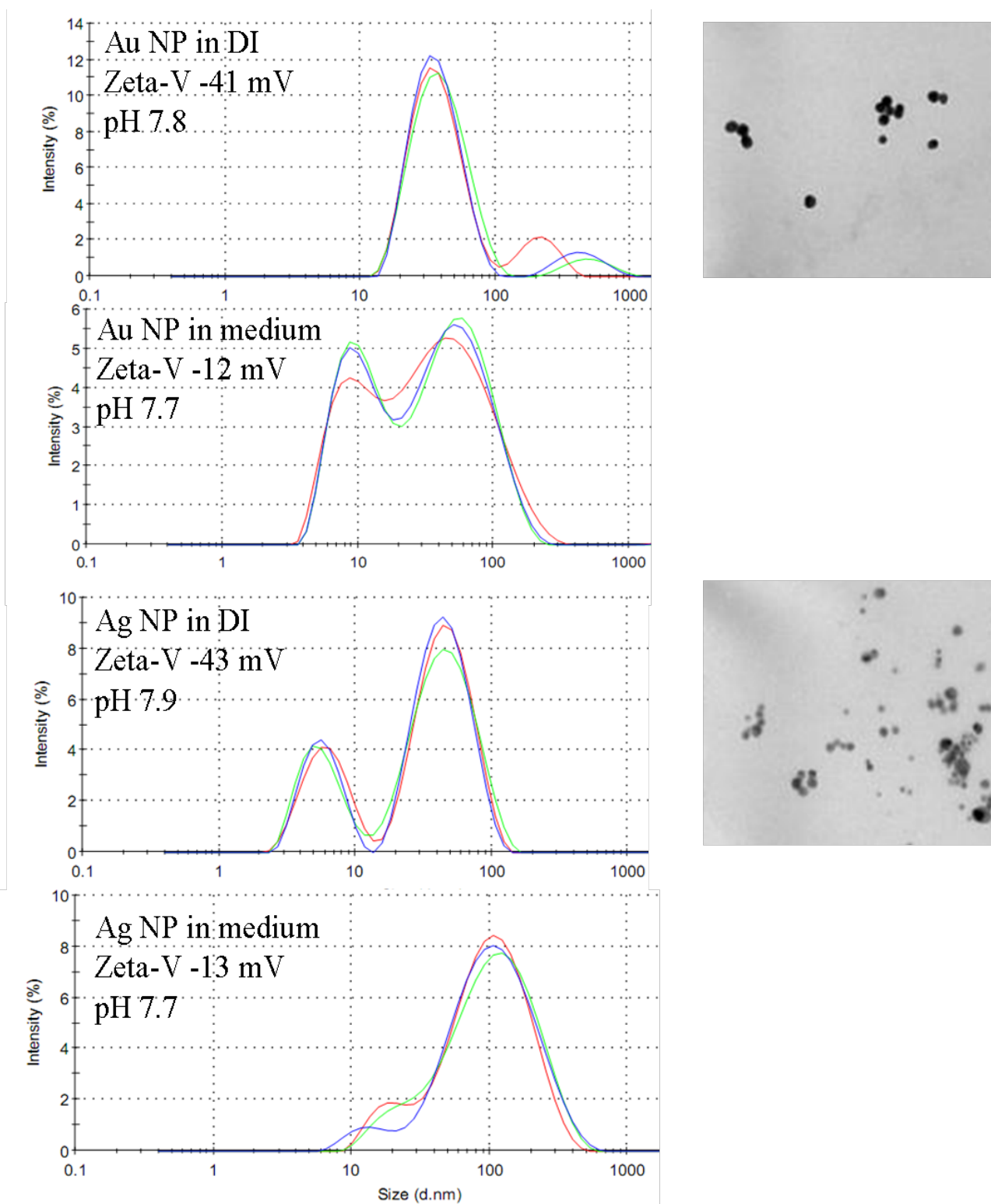


Suppl. Fig. 1 Contact angle measurements of APTS modified (a) PDMS and (b) SiNx surfaces. Left images show DI water droplets deposited on untreated chip materials while right images were taken after surface modification.

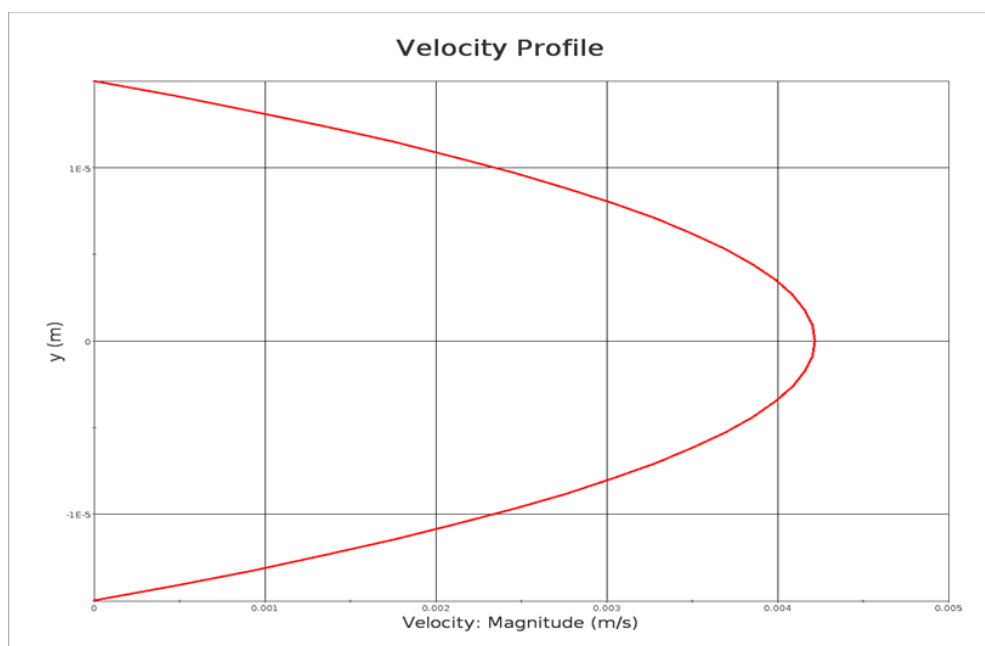


Suppl. Fig. 2: Immunofluorescence images of collagen biosynthesis by NHDF cells using eight well chamber slides. Following 3, 24 and 48 hours after cell seeding, cells are washed, fixed and incubated with anti-collagen I-V Ab and stained using rhodamin-conjugated secondary antibody.

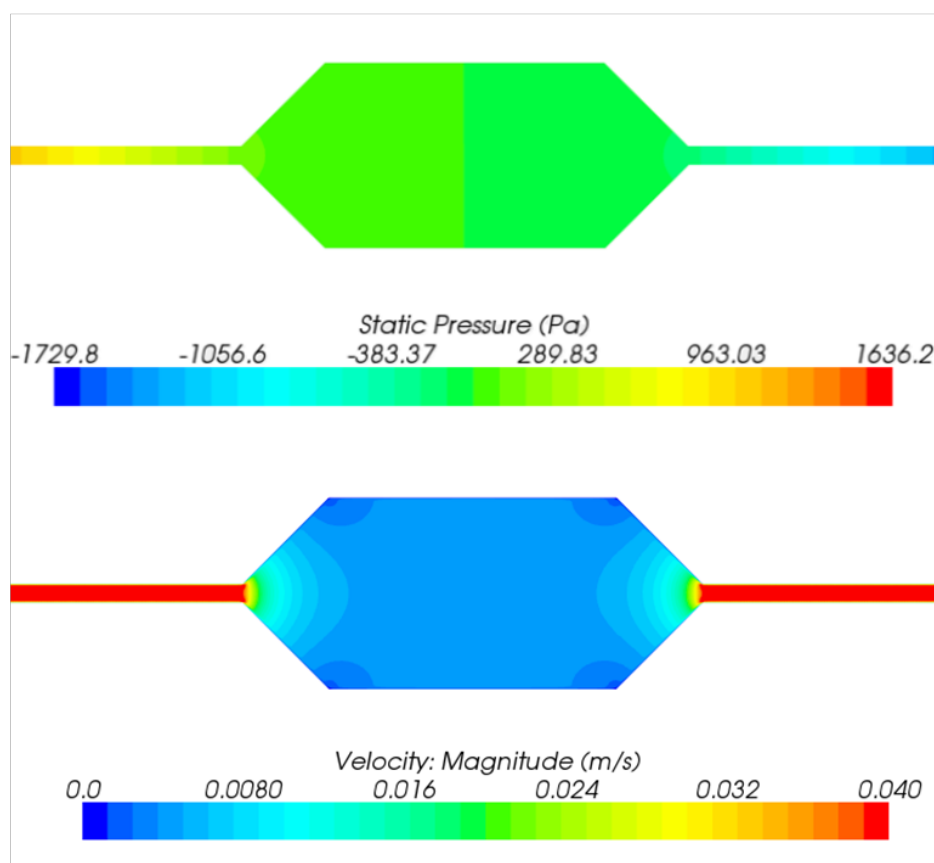


Suppl. Fig. 3 Characterization of gold and silver nanoparticle suspensions using DLS and TEM measurements. Size, size distribution and Zeta potentials are of gold and silver nanoparticles in DI water and DMEM using DLS are shown on the left. Corresponding TEM images of nanoparticles in DI water providing information on agglomeration status are shown on the right.

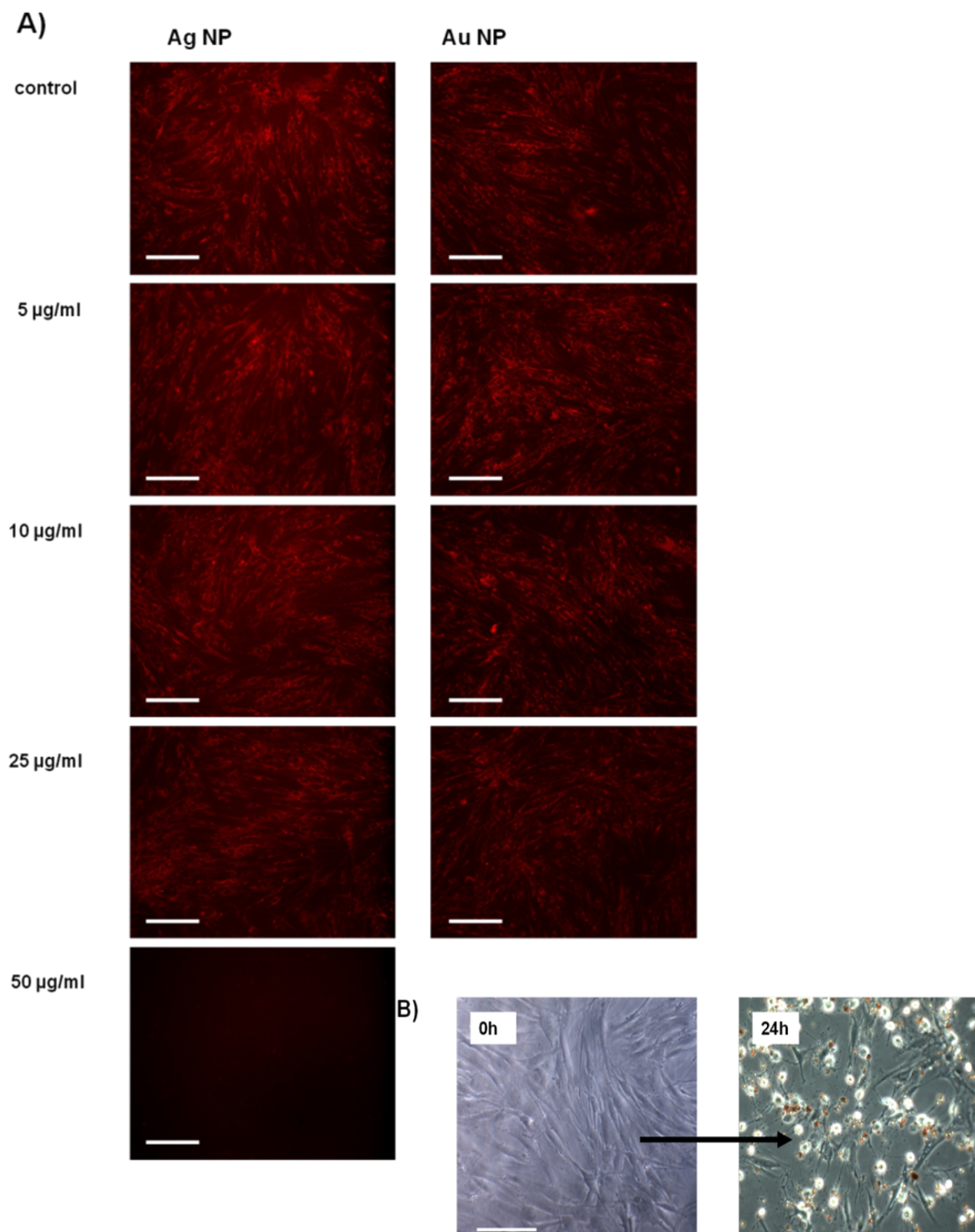
A



B



Suppl. Fig 4. Computational fluid dynamic simulations. (A) Parabolic velocity profile inside the chamber for an average fluid velocity of 0.00277m/s and inlet velocity of 0.0277m/s. (B) Static pressure (top picture) and magnitude of the fluid velocity (bottom picture) at a horizontal plane.



Suppl. Fig. 5: Cytotoxic assay of nanoparticles on NHDF cells in standard culture plates. A) Pictures show fibroblast cells after 24h incubation with increasing concentrations of gold and silver NPs. TMRE staining reveals dose-dependent loss of mitochondrial membrane potential with increasing concentrations of silver NPs. B) Microscope pictures of NHDF before and after 24h incubation with 50µg/ml silver NP. Scale bars represent 100µm (A) and (B).

Suppl. Table 1: Impedance measurements in the presence of increasing applied AC potentials and visual inspected cell adhesion using human fibroblasts (NHDF). Standard deviation of the baseline is calculated following 20 consecutive measurements.

| Applied V _{pp} mV | IZI @ 100 kHz Ω | SD (n = 20) | Visual cell adhesion after 3 h |
|-------------------------------|--------------------|----------------|-----------------------------------|
| 15 | 5,180 | ± 120 Ω | +++ |
| 30 | 5,180 | ± 31 Ω | +++ |
| 60 | 5,190 | ± 13 Ω | +++ |
| 90 | 5,185 | ± 9 Ω | +++ |
| 120 | 5,195 | ± 8 Ω | +++ |
| 150 | 5,170 | ± 5 Ω | +++ |
| 180 | 5,160 | ± 5 Ω | +++ |
| 210 | 5,175 | ± 4 Ω | +++ |
| 420 | 5,180 | ± 5 Ω | +++ |