Supporting Information

Size-dependent penetration of gold nanoprobes into fixed cells

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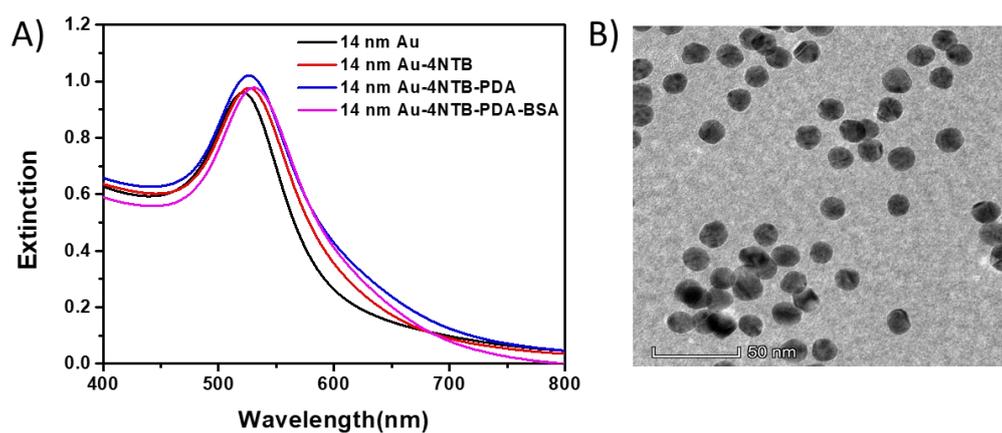
Figure S1: (A) UV-Vis spectra of 14 nm nanoprobes at each step during surface modification. (B) TEM image of the 14 nm nanoprobes.

A)

14 nm AuNPs after growth   29 nm AuNPs after growth   55 nm AuNPs after growth

B)
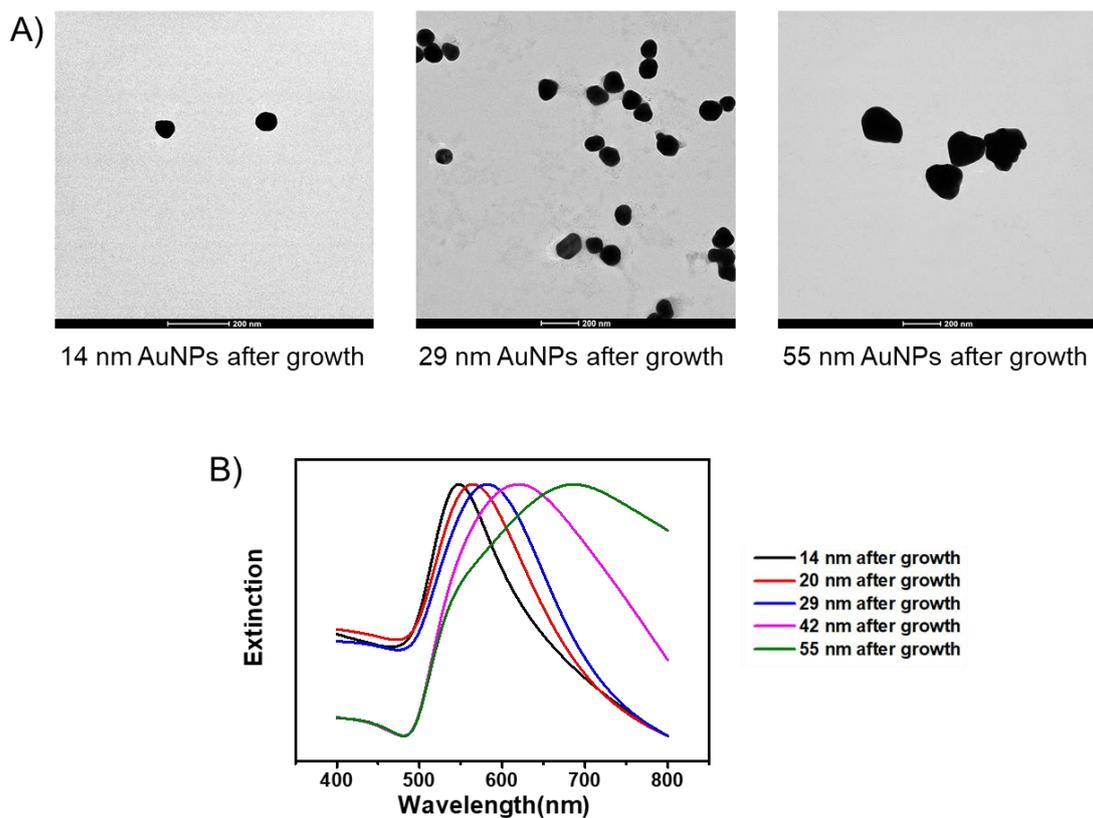
Figure S2: A) TEM images of 14 nm, 29 nm and 55 nm Au NPs after growth. Scale bar: 200 nm. B) UV-Vis spectra of the NPs of different sizes after adding the Au growth solution.

14 nm   20 nm   29 nm

42 nm   55 nm
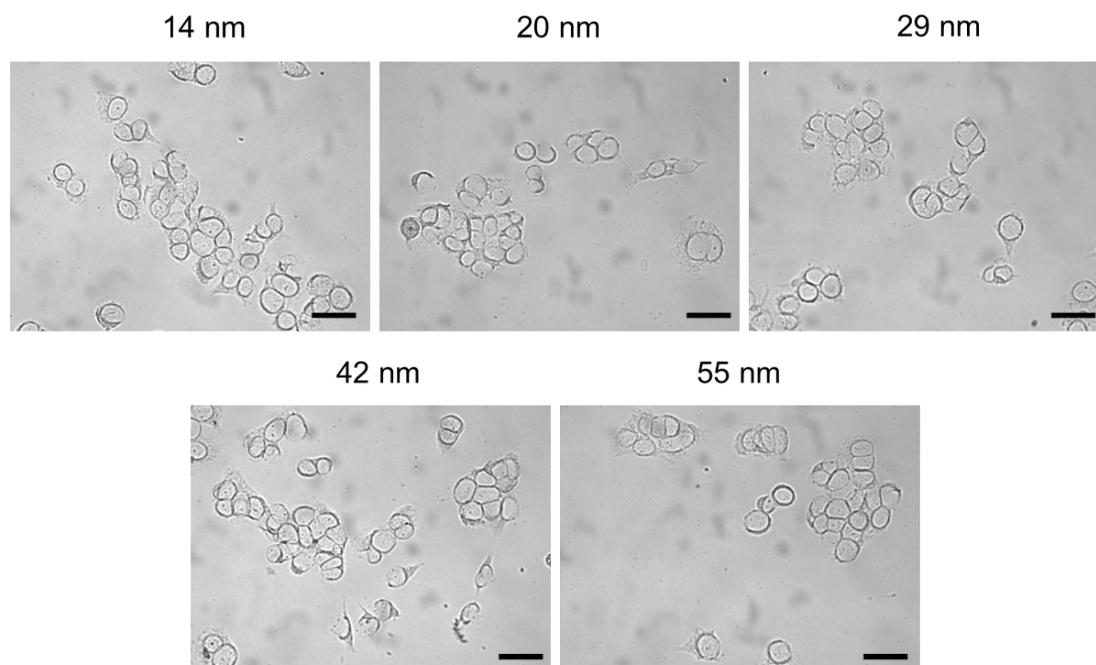
Figure S3: Highly magnified bright-field images (40X) of cells incubated with nanoprobes of different sizes. Scale bar: 20 μm.
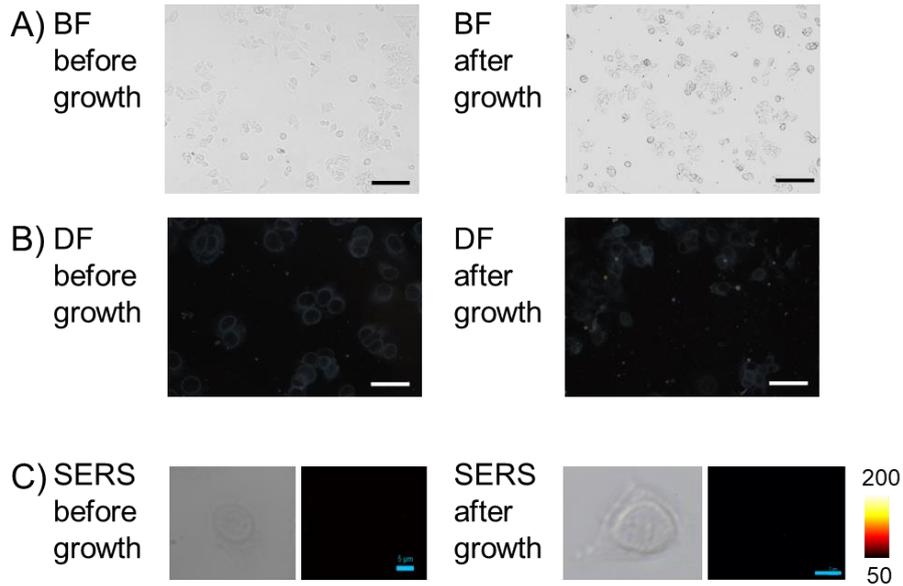
Figure S4: A) Bright-field images, B) Dark-field images and C) Typical SERS scanning images of methanol-fixed MCF-7 cells incubated without nanoprobes, before (left) and after (right) adding the Au growth solution. Scalebar in BF images: 100 μm; Scalebar in DF images: 50 μm; Scalebar in SERS images: 5 μm.
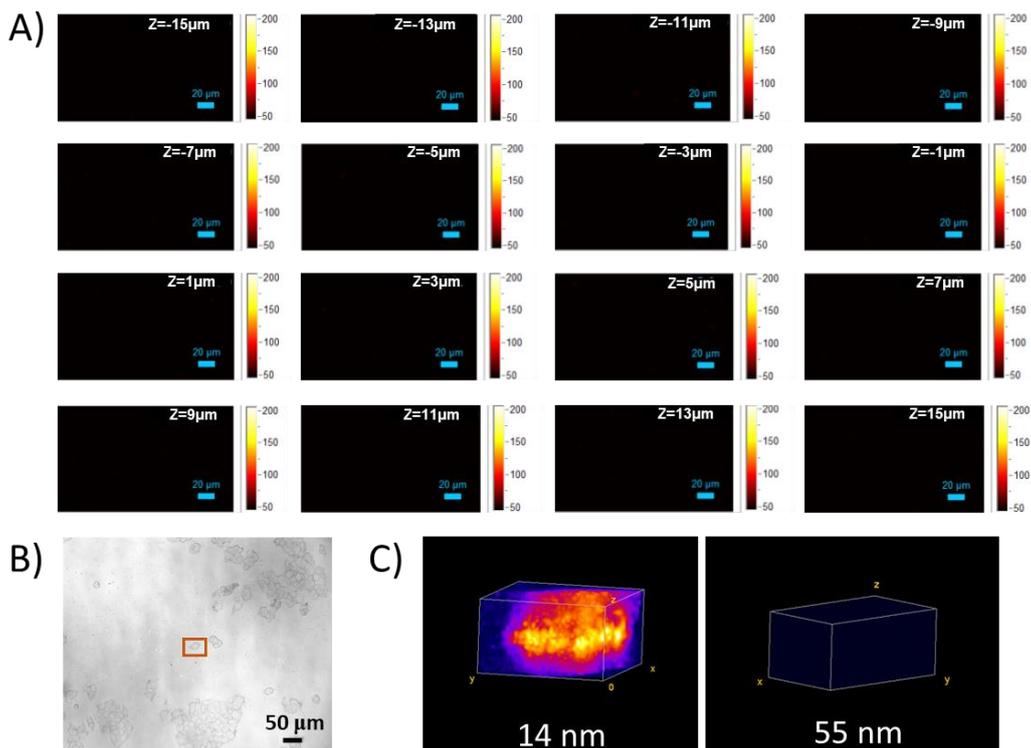
Figure S5: A) Three-dimensional SERS scanning images of a methanol-fixed MCF-7 cell incubated with 55 nm nanoprobes and after growth. Scalebar: 20 μm. B) Bright-field image of the selected cell. C) 3D projection of the SERS images of a cell incubated with 14 nm and 55 nm nanoprobes, respectively.
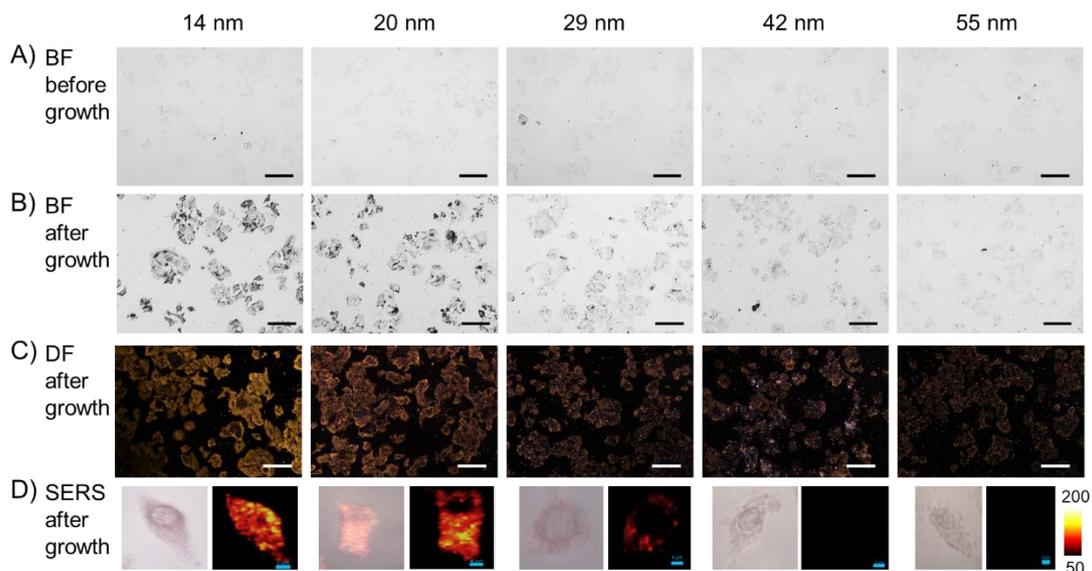
Figure S6: Penetration of nanoprobes into 4% PFA-fixed and 4% Tween 20-permeabilized MCF-7 cells. A) Bright-field images of cells incubated with nanoprobes of different sizes. B) Bright-field images and C) Dark-field images of the cells after adding the Au growth solution. D) Typical SERS scanning images of the cells incubated with nanoprobes of different sizes and after growth. Scalebar in BF/DF images: 100 μm; Scalebar in SERS images: 4 μm.
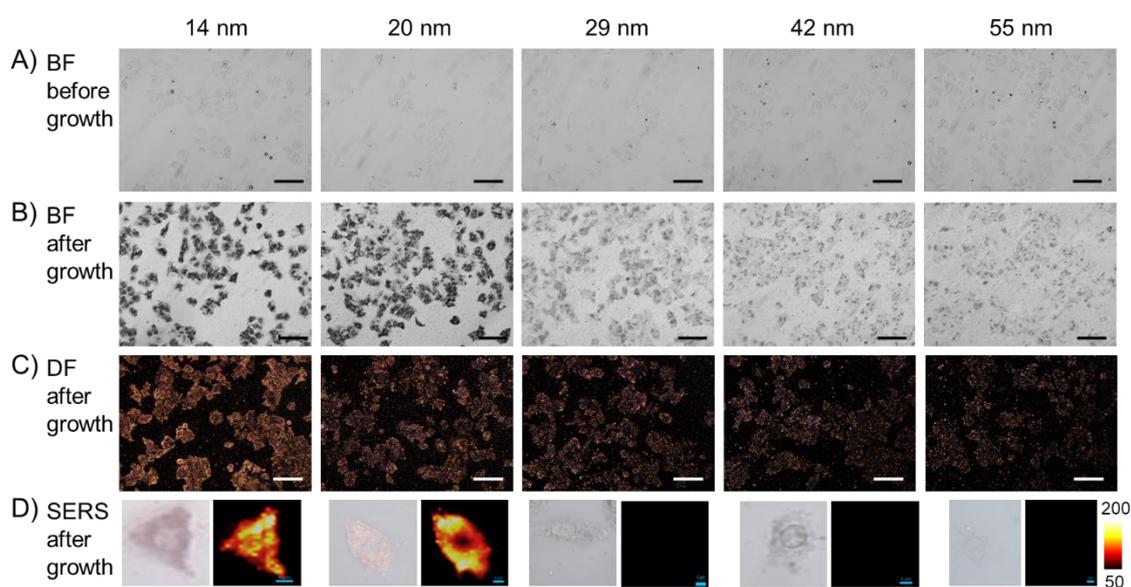
Figure S7: Penetration of nanoprobes into 4% PFA-fixed and 0.1% Triton X-100-permeabilized MCF-7 cells. A) Bright-field images of cells incubated with nanoprobes of different sizes. B) Bright-field images and C) Dark-field images of the cells after adding the Au growth solution. D) Typical SERS scanning images of the cells incubated with nanoprobes of different sizes and after growth. Scalebar in BF/DF images: 100 μm; Scalebar in SERS images: 4 μm.
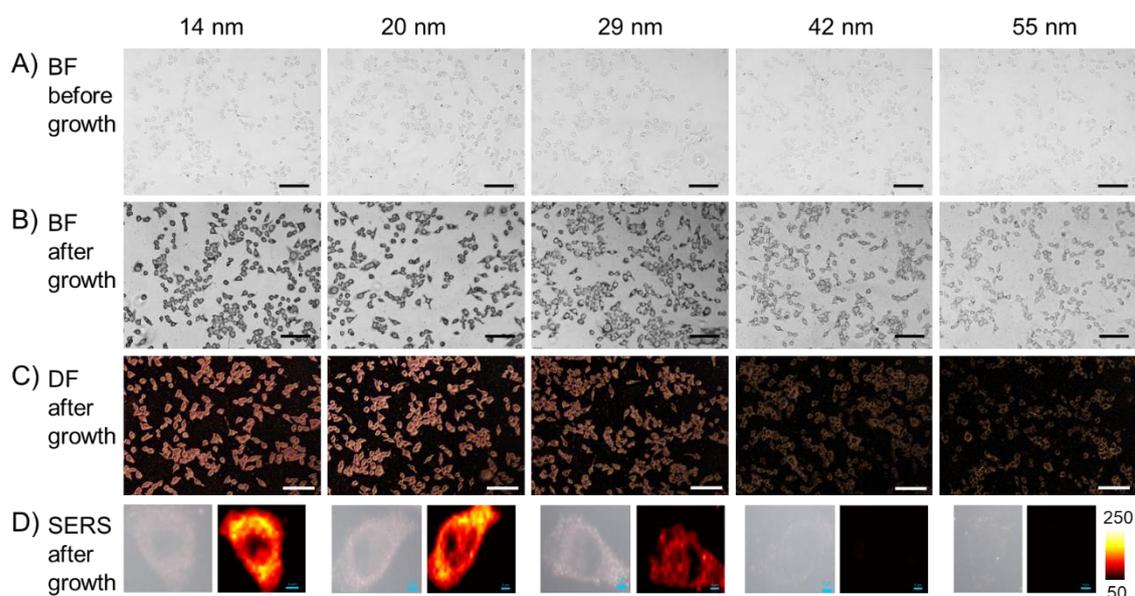
Figure S8: Penetration of nanoprobes into methanol-fixed T47D cells. A) Bright-field images of cells incubated with nanoprobes of different sizes. B) Bright-field images and C) Dark-field images of the cells after adding the Au growth solution. D) Typical SERS scanning images of the cells incubated with nanoprobes of different sizes and after growth. Scalebar in BF/DF images: 100 μm; Scalebar in SERS images: 4 μm.
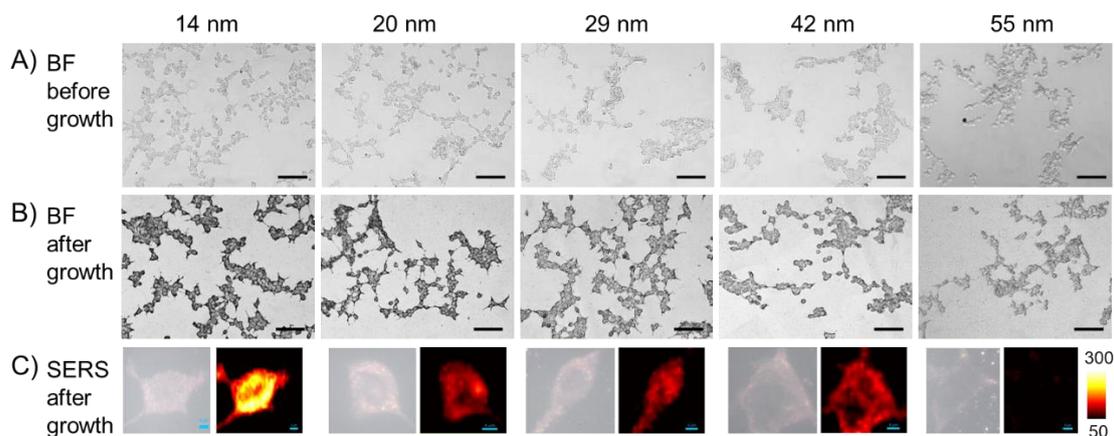
Figure S9: Penetration of nanoprobes into methanol-fixed HEK293 cells. A) Bright field images of cells incubated with nanoprobes of different sizes. B) Bright-field images of the cells after adding the Au growth solution. C) Typical SERS scanning images of the cells incubated with nanoprobes of different sizes and after growth. Scalebar in BF images: 100 μm; Scalebar in SERS images: 4 μm.
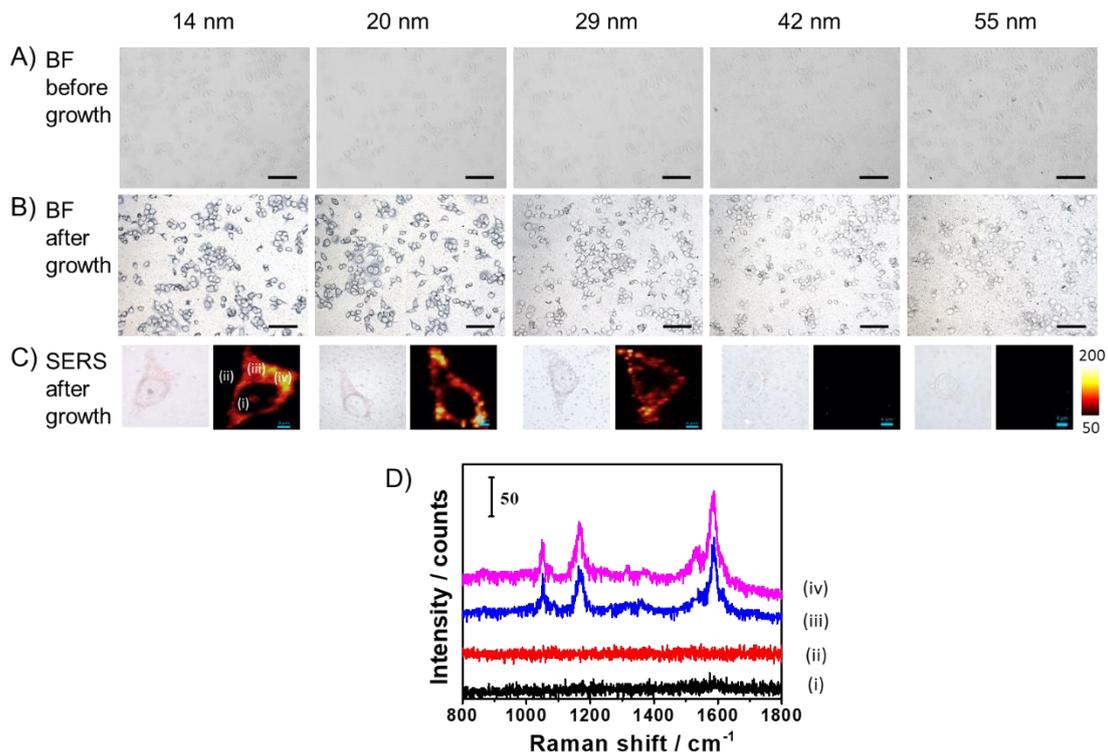
Figure S10: Penetration of nanoprobes into methanol-fixed MCF-7 cells using MMC as the Raman reporter molecules. A) Bright-field images of cells incubated with nanoprobes of different sizes. B) Bright-field images of the cells after adding the Au growth solution. C) Typical SERS scanning images of the cells incubated with nanoprobes of different sizes and after growth. D) Representative SERS spectra in the cell incubated with 14 nm nanoprobes (locations are shown in Figure S10C). Scalebar in BF images: 100 μm; Scalebar in SERS images: 4 μm.
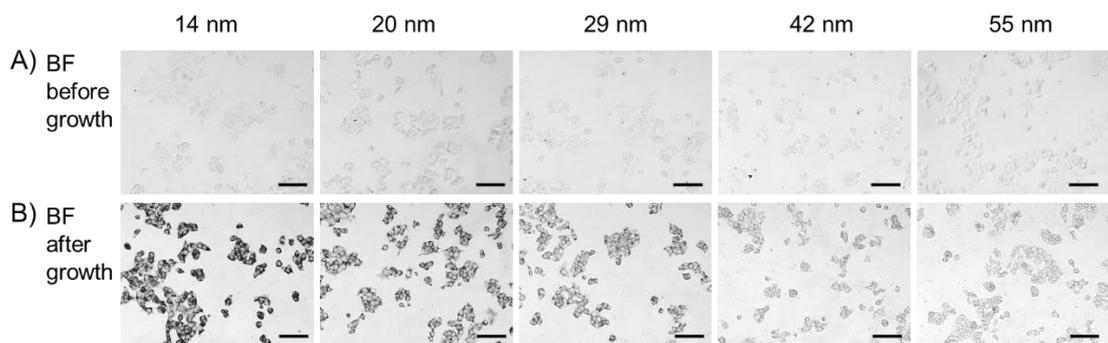
Figure S11: Penetration of Au NP-BSA into methanol-fixed MCF-7 cells. A) Bright-field images of cells incubated with Au NP-BSA of different sizes. B) Bright-field images of the cells after adding the Au growth solution. Scale bar: 100 μm.
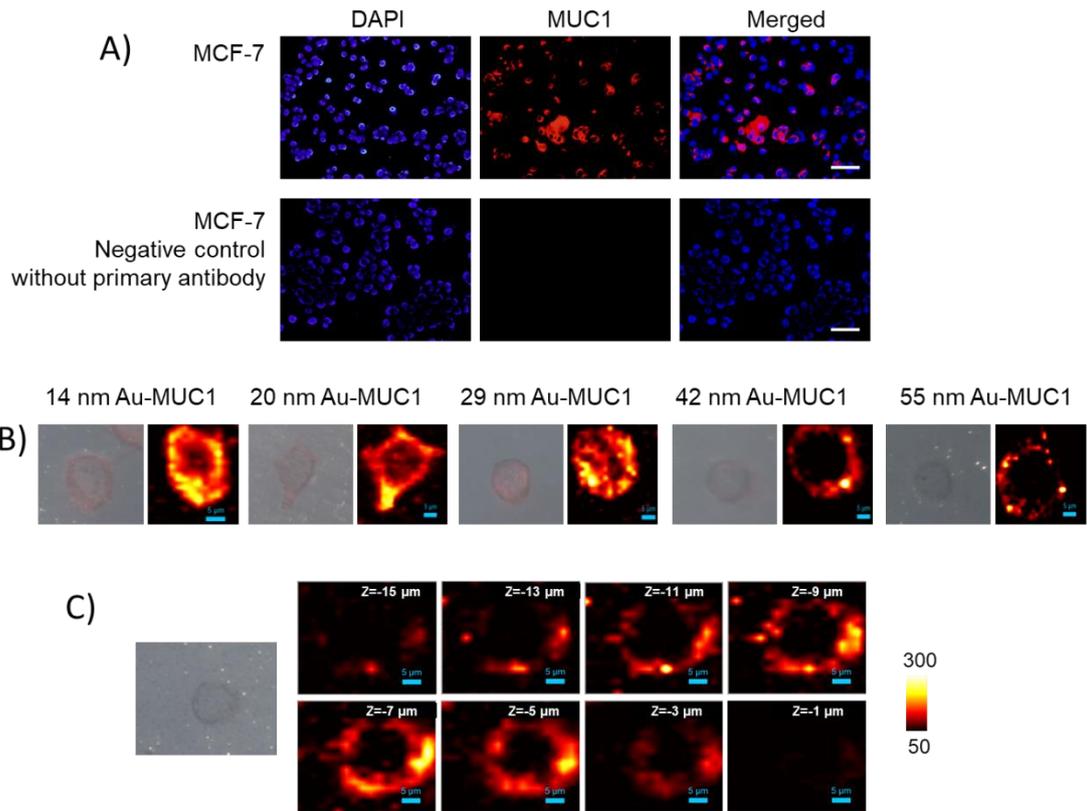
Figure S12: Penetration of MUC1-targeting nanoprobes into methanol-fixed MCF-7 cells. A) Immunofluorescence staining of MUC1 in methanol fixed MCF-7 cells. Scale bar: 50 μm. B) Typical SERS scanning images of the cells incubated with MUC1 targeting nanoprobes of different sizes and after growth. C) Three-dimensional SERS scanning images of a methanol-fixed MCF-7 cell incubated with 55 nm MUC1 targeting nanoprobes and after growth. Scalebar in SERS images: 5 μm.
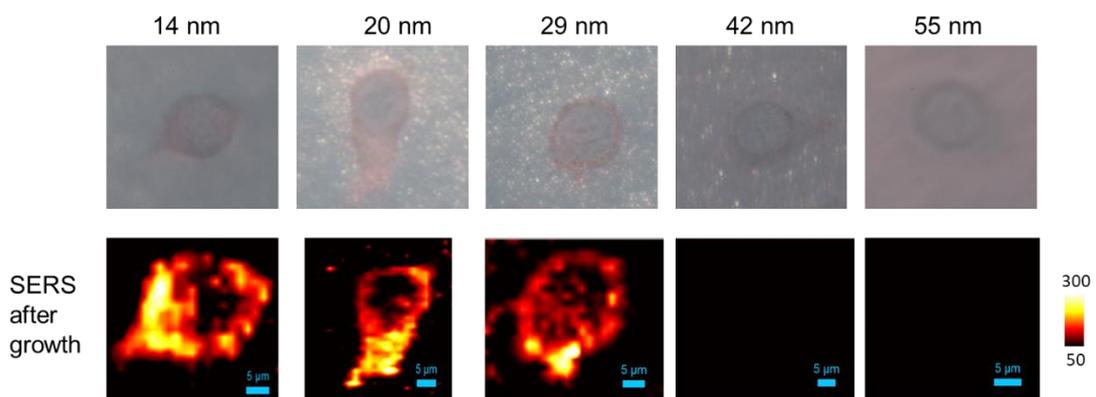
Figure S13: Penetration of nanoprobes into methanol-fixed MCF-7 cells at equal NP concentration (0.28 nM). Scale bar: 5 μm.