Supporting Information:

‘Ghost’ Silica Nanoparticles of ‘Host’-Inherited Antibacterial Action

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Contents

TEM images of SiO_2-coated CuONPs and a surface-rough SiO_2NPs-2.

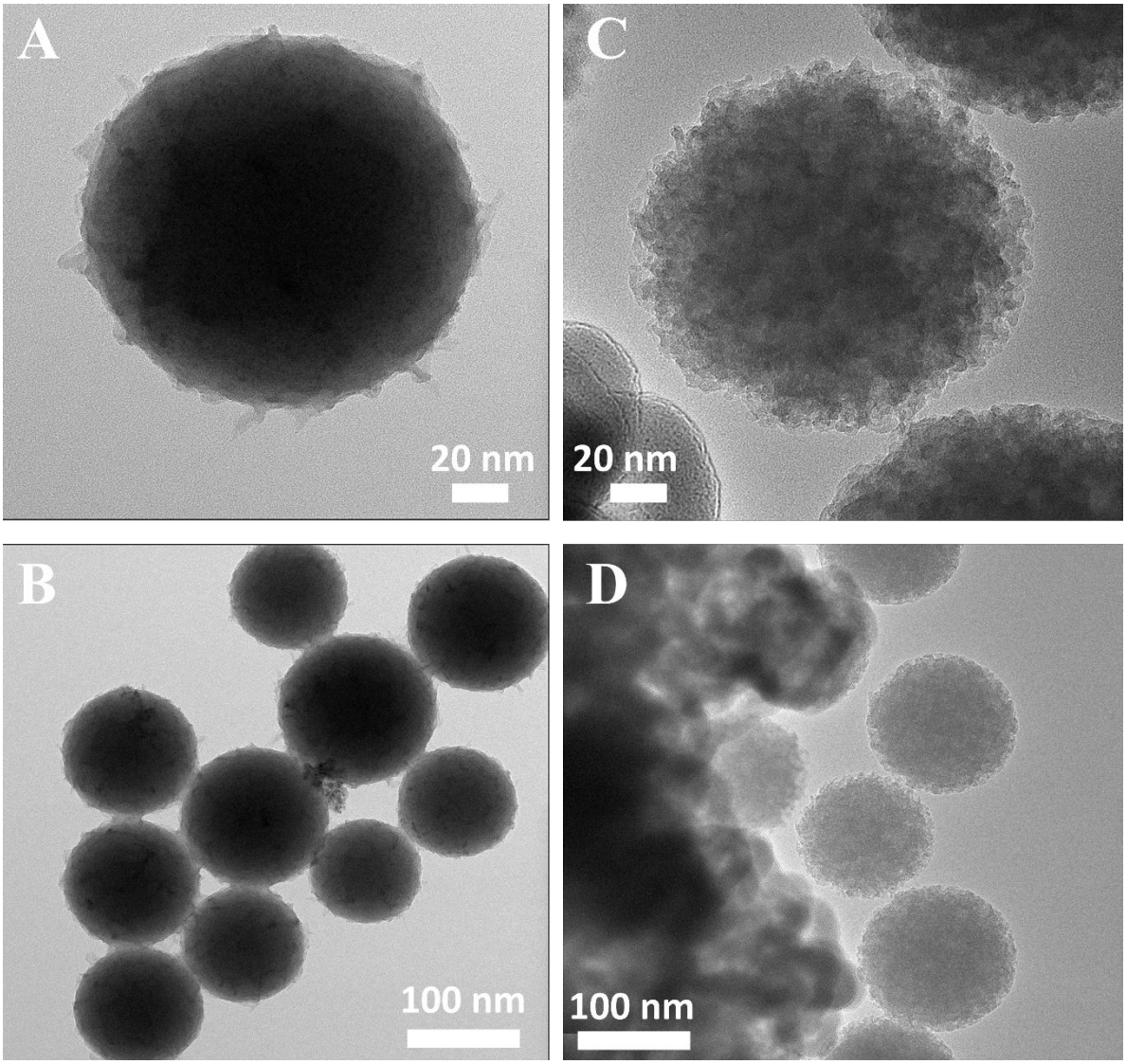

Figure S1. TEM images of (A and B) SiO_2-coated CuONPs producing a surface-rough SiO_2NPs-2 and (C and D) mesoporous ghost SiO_2NPs-2 at different magnifications.

The zeta potential and particle size of surface functionalized CuONPs by SiO_2, GLYMO and 4-HPBA.

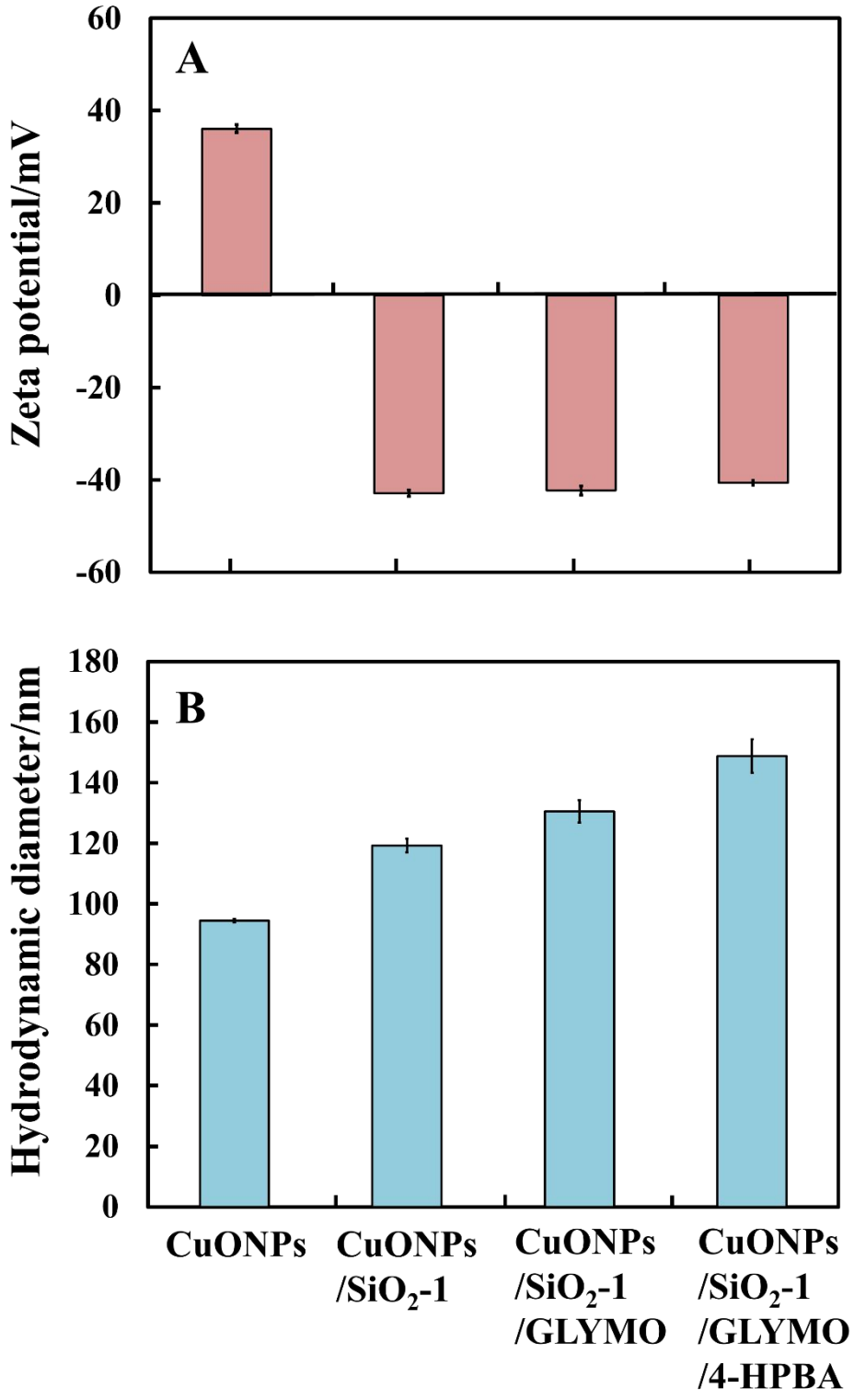

Figure S2. The (A) zeta potential and (B) particle size of bare CuONPs, CuONPs/SiO_2, CuONPs/SiO_2/GLYMO and CuONPs/SiO_2/GLYMO/4-HPBA.

The zeta potential and particle size of surface functionalized rough SiO_2NPs-2.

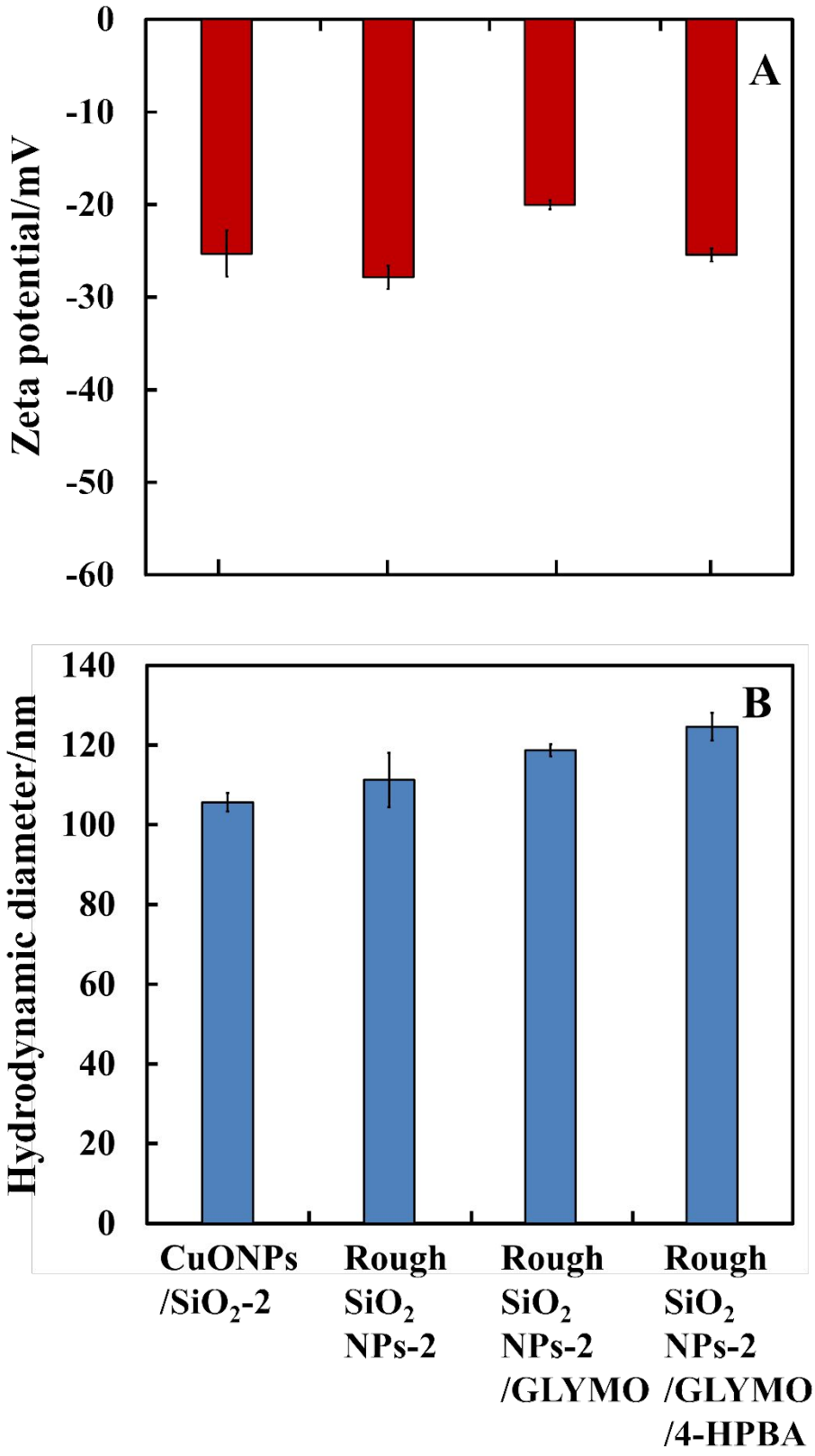

Figure S3. The (A) zeta potential and (B) particle size of CuONPs/SiO_2-2, rough SiO_2NPs-2, rough SiO_2NPs-2/GLYMO and rough SiO_2NPs-2/GLYMO/4-HPBA.

Antibacterial activity of surface functionalized rough SiO_2NPs-2 on *R. rhodochrous.*

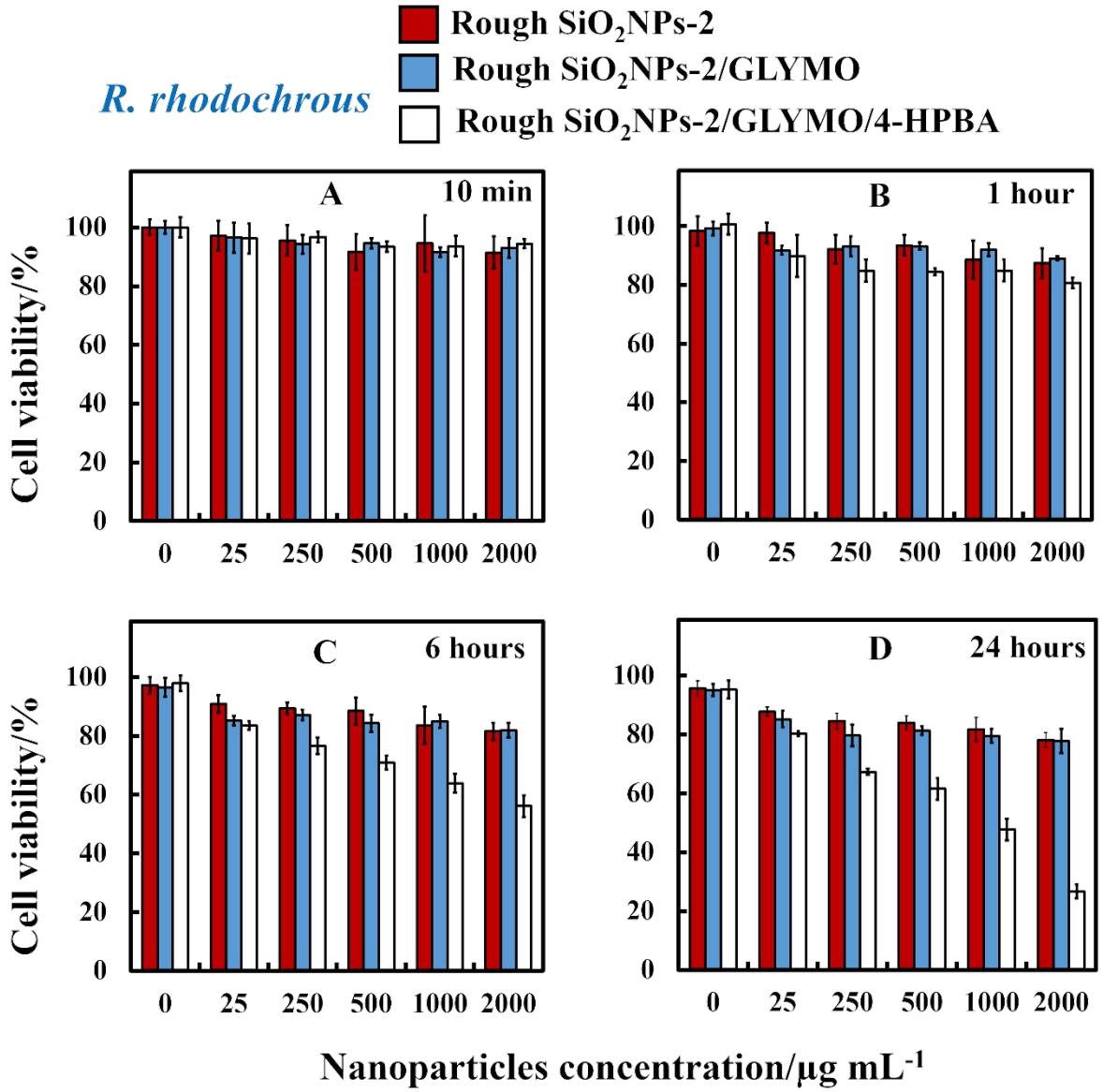

Figure S4. Representative the cell viability of *R. rhodochrous* upon incubation of bare and surface functionalized of rough SiO_2NPs-2 of different particle concentrations. The *R. rhodochrous* cells were incubated with the rough SiO_2NPs-2, rough SiO_2NPs-2/GLYMO and rough SiO_2NPs-2/GLYMO/4-HPBA at 10 min, 1 hour, 6 hours and 24 hours of exposure times.

Antibacterial activity of free GLYMO and 4-HPBA.

Figure S5 shows the cytotoxicity assay of the free GLYMO and 4-HPBA on *R. rhodochrous* for up to 24 hours of exposure. Antibacterial activity experiments were done at the varying overall GLYMO and 4-HPBA concentration and different incubation times. One can see a very small effect on the presence of free GLYMO on the *R. rhodochrous* viability over a period of up to 24 hours (Figure S5D). One can conclude that the free GLYMO and 4-HPBA does not measurably impact the *R. rhodochrous* viability up to 2000 μg mL^{-1}. Note that in our rough SiO_2NPs/GLYMO/HPBA nanoparticles there is not ant free HPBA and free GLYMO as the particles have undergo multiple washing/centrifugation cycles after their surface functionalization. However, at these concentrations of the HPBA- grafted on rough SiO_2NPs, the effect of the rough SiO_2NPs on *R. rhodochrous* is very significant – see Figure 11. Therefore, one may conclude that the HPBA- grafted rough SiO_2NPs shows excellent antibacterial with this bacteria which is not related to free HPBA.

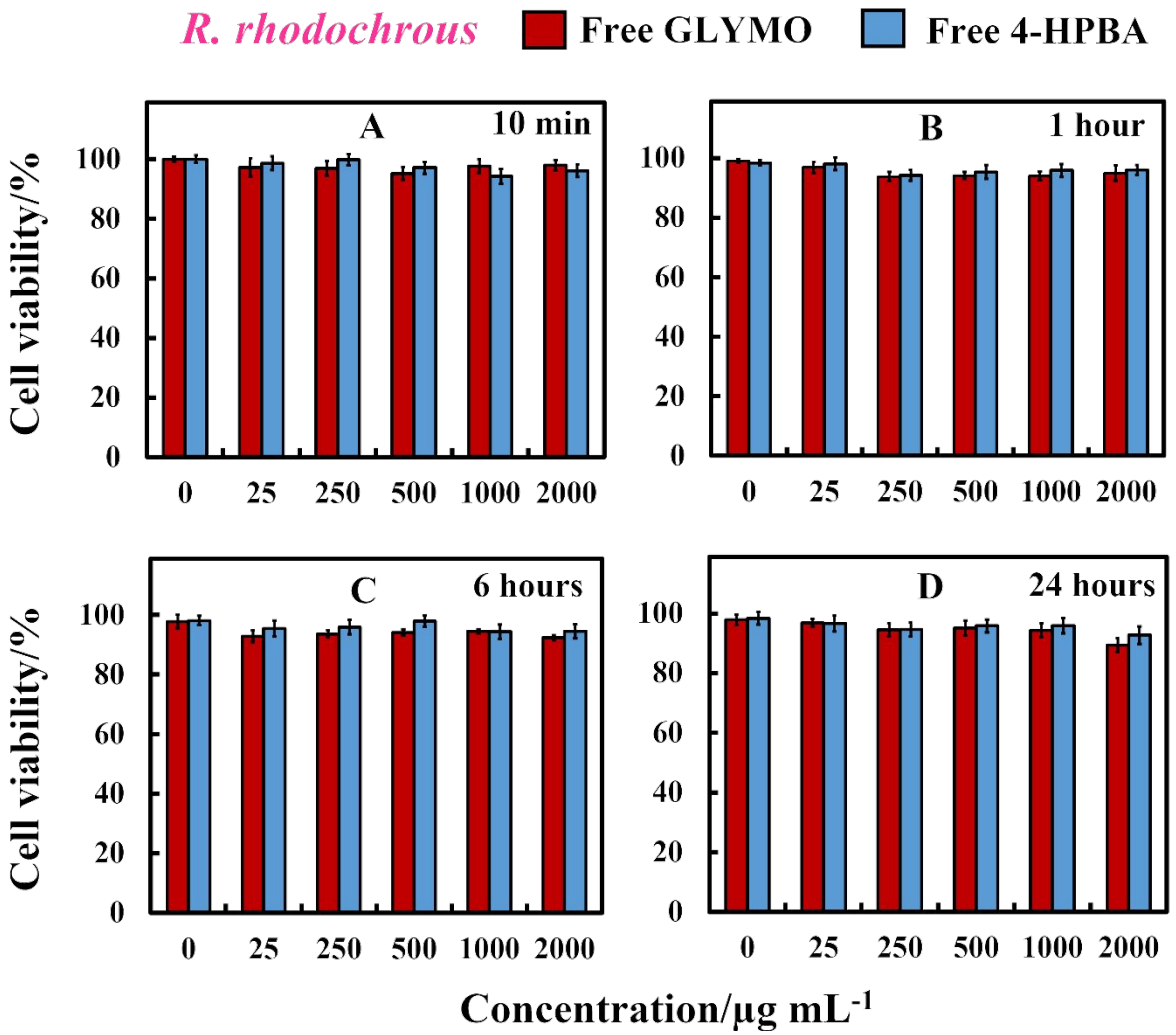

Figure S5. The antibacterial activity of free GLYMO and 4-HPBA at various concentrations (0, 25, 250, 500, 1000 and 2000 μg mL^{-1}) on *R. rhodochrous*. The *R. rhodochrous* was incubated with the GLYMO and 4-HPBA at 10 min, 1 h, 6 h and 24 h of exposure before being washed and tested for their cell viability.

HaCaT cell viability after incubation as a function of nanoparticle concentration

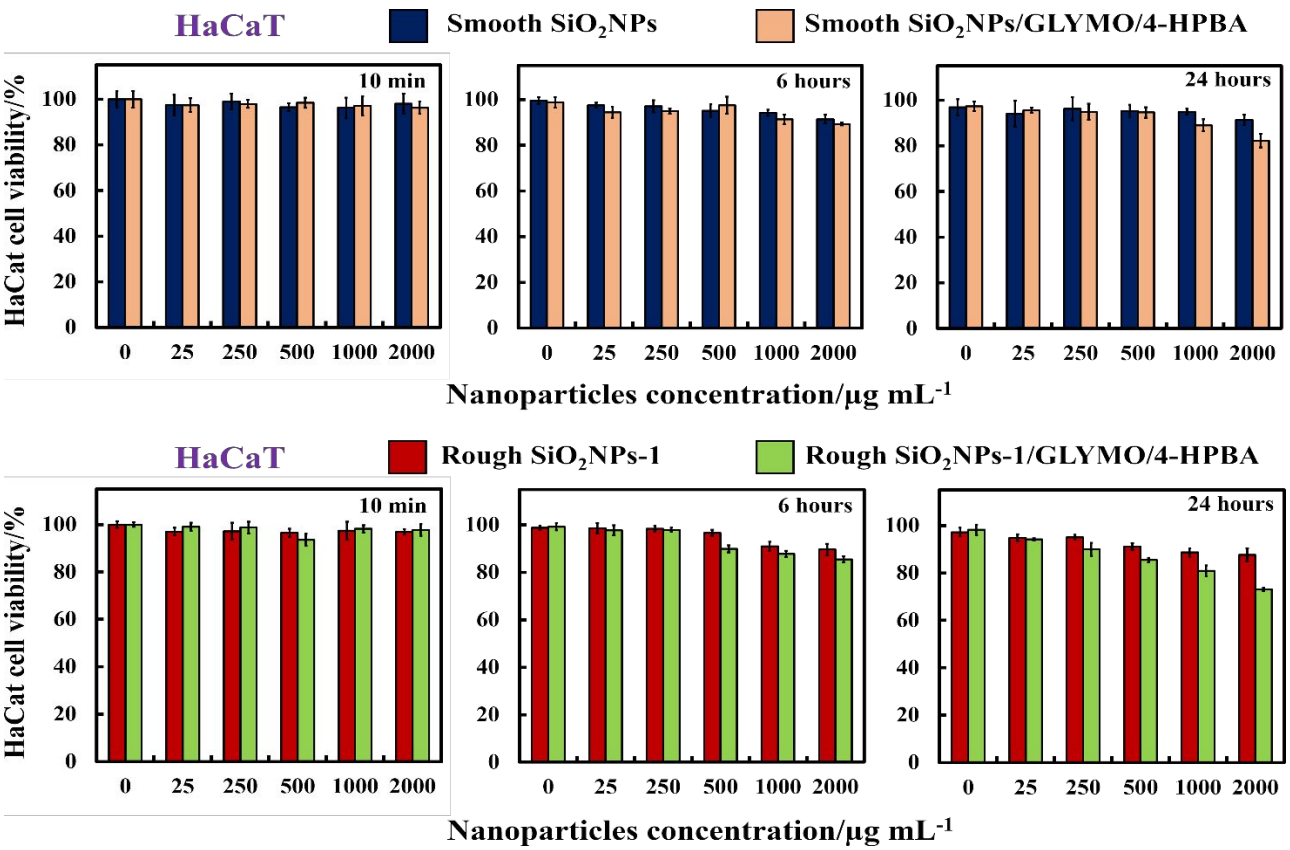

Figure S6. HaCaT cell viability after incubation as a function of nanoparticle concentration for up to 24 hours at with bare and surface functionalized SiO_2NPs with GLYMO and 4-HPBA.

Antibacterial activity of surface functionalized rough SiO_2NPs and smooth SiO_2NPs on *E.coli*

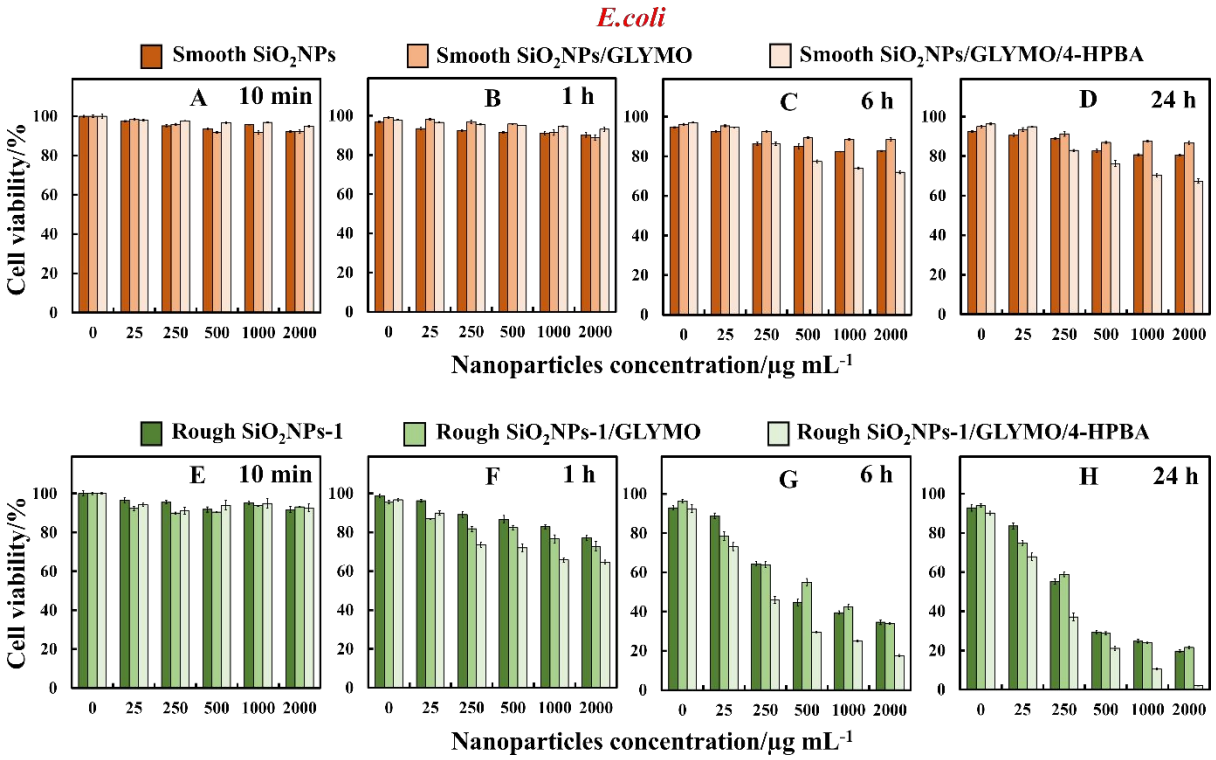

Figure S7. Cell viability of *E.coli* as a function of the nanoparticle concentration with (A-D) smooth SiO_2NPs, SiO_2NPs/GLYMO and SiO_2NPs/GLYMO/4-HPBA. (E-H) Cell viability of *E.coli* upon incubation of bare and surface functionalized of rough SiO_2NPs of different particle concentrations. The incubation times were (A,E) 10 min, (B,F) 1 h, (C,G) 6 h and (D, H) 24 h, respectively.