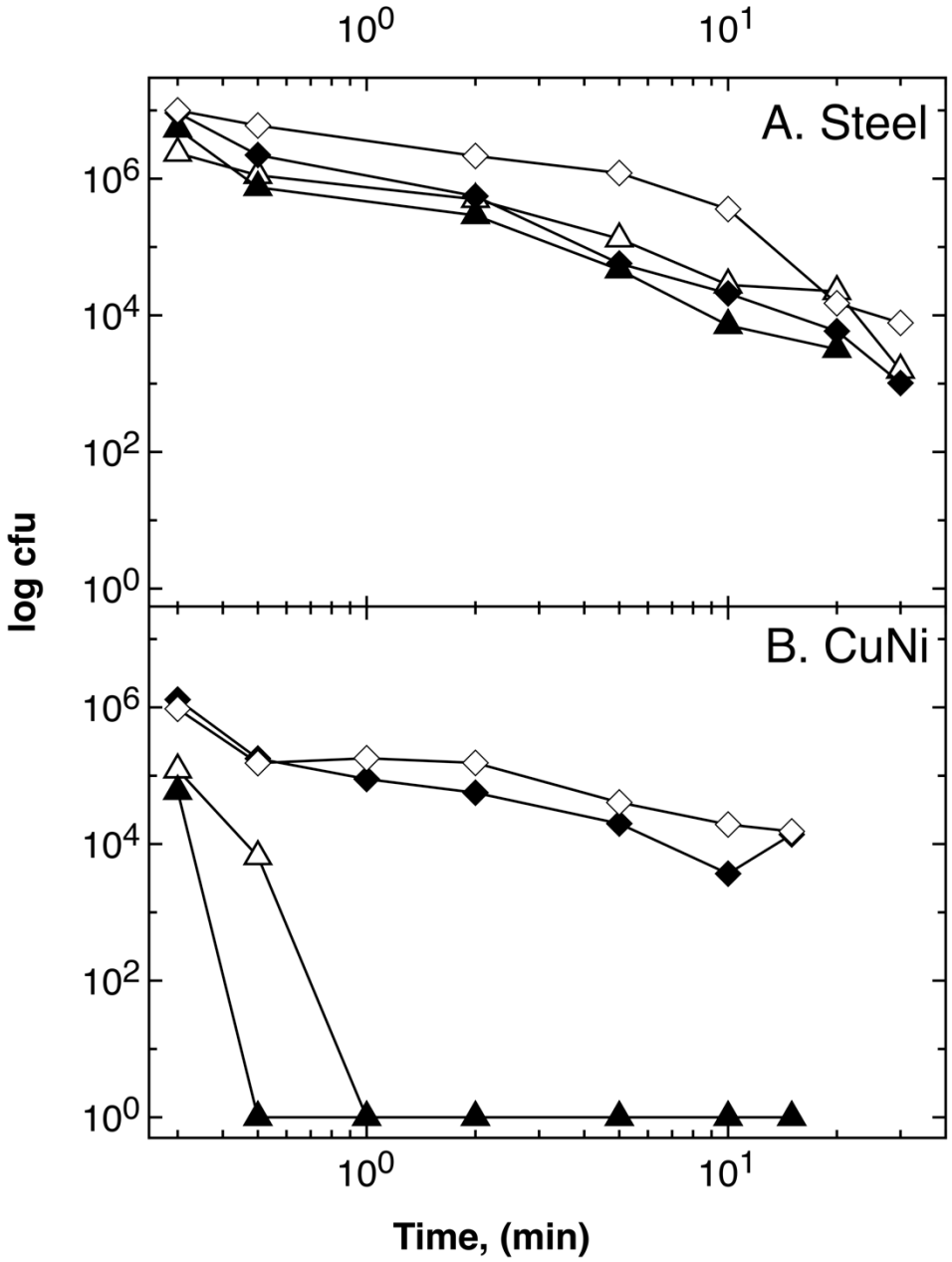
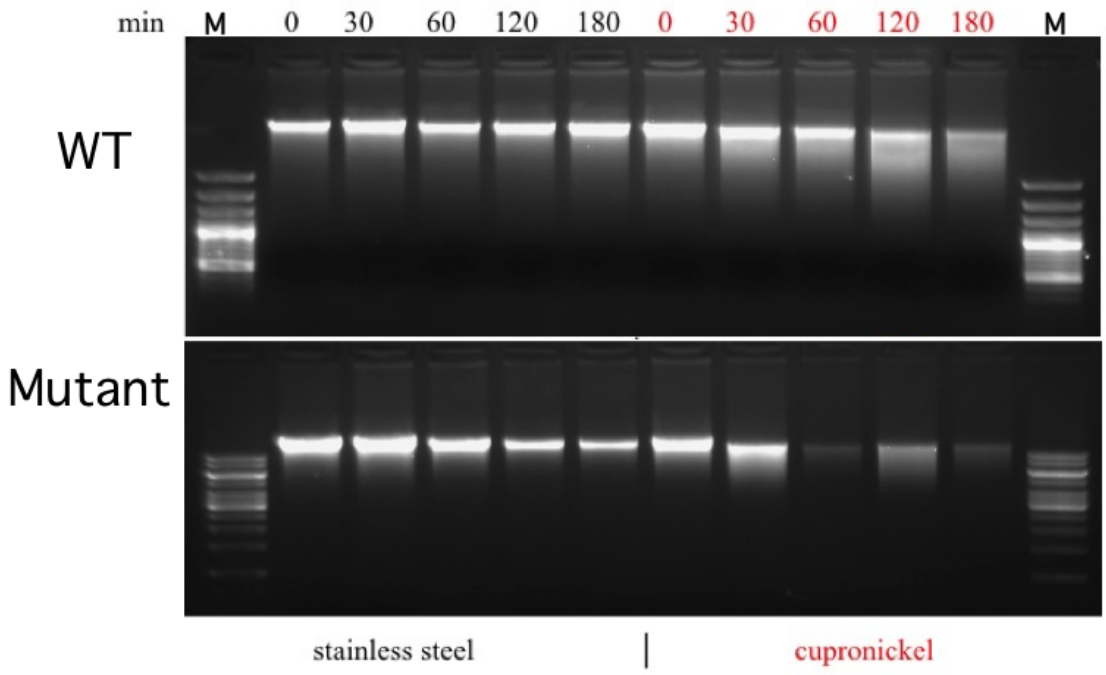
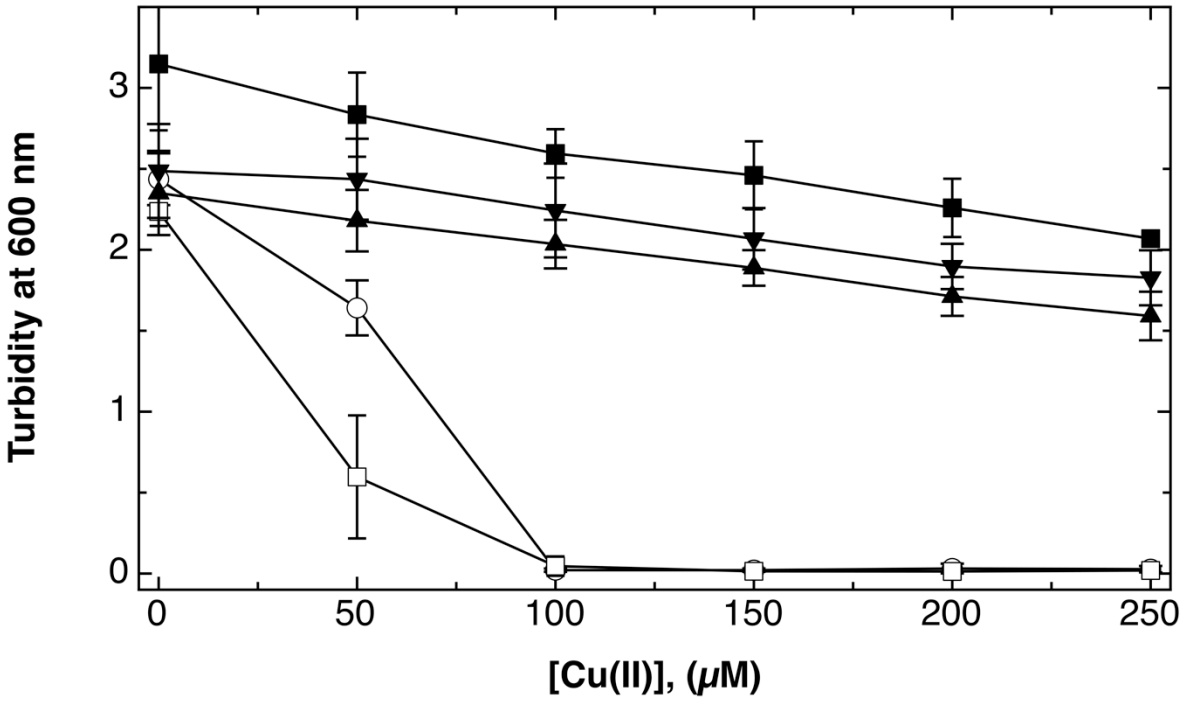
Supplementary material



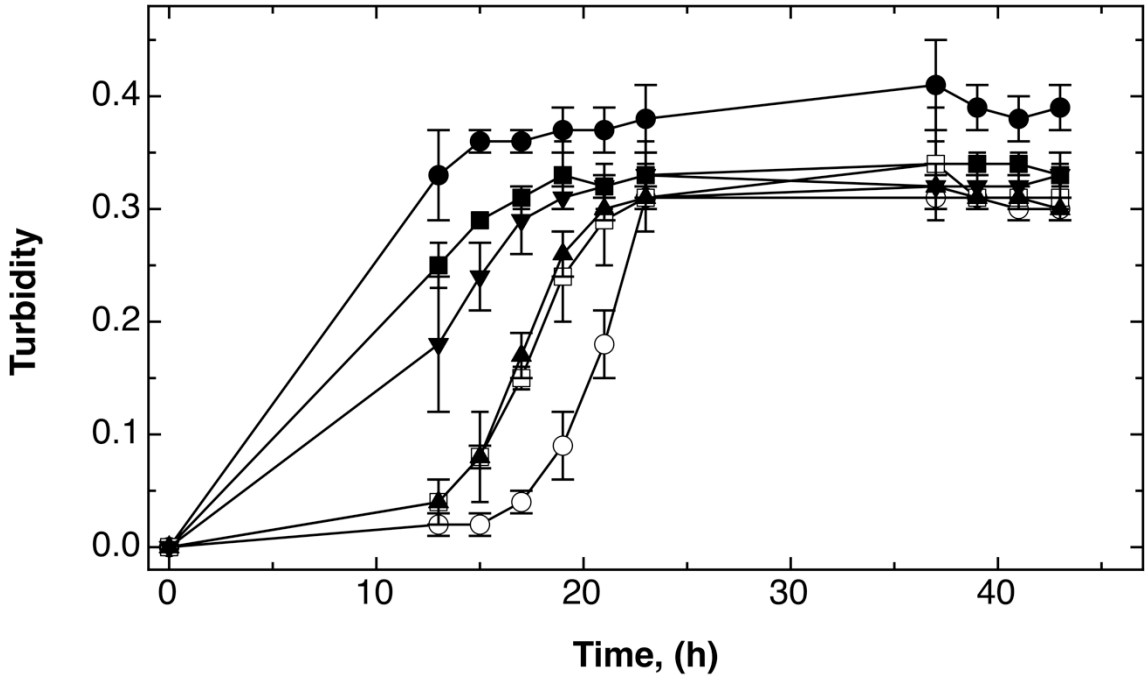
Supplementary Figure S1. Survival of *E. coli* mutants on cupronickel. Cells of *E. coli* mutant strains Δ*copA* Δ*cueO* Δ*cusCFBA*(◆), Δ*copA* Δ*cueO* Δ*cusCFBA* Δ*dps* (◇), Δ*copA* Δ*ghsA*(▲) and Δ*copA* Δ*ghsA* Δ*dps* (Δ) were streaked on stainless steel (Panel A) or cupronickel (Panel B). After the indicated time periods at ambient conditions (23°C) cells were removed from metal surfaces, diluted, and plated on LB agar. Surviving cells were counted as CFU after 16 h at 37°C. 10^0 in the semi-log plot indicates no survivors. Mean value of three repeats, deviation bars not shown to avoid cluttering.



Supplementary Figure S2. DNA-degradation on solid surfaces. *E. coli* wild type (WT, top) and Δ*copA* Δ*gshA* mutant strain (Mutant) was incubated on stainless steel (left) or cupronickel (right) for up to 3 h, the cells were re-suspended, DNA was isolated, run on an agarose gel, and stained with ethidium bromide. This experiment was performed several times with the outcome, decreased stability of the DNA from mutants on cupronickel in comparison to DNA from wild type or from cells on stainless steel. M, size marker lane.



Supplementary Figure S3. Expression of *gshA* or *gshB in trans* in a Δ*ghsA* or Δ*ghsB* mutant strain, respectively, restores copper resistance under aerobic conditions. Dose response curves (16 h at 37°C with shaking in TMM containing 2 g/L of the respective carbon source) were recorded for *E. coli* W3110 mutant strains Δ*copA* (■),Δ*copA* Δ*ghsA* (❍), Δ*copA* Δ*ghsB* (❑), all containing the empty vector plasmid pASK3, and Δ*copA* Δ*ghsA* (pASK3::*gshA*)(▲), Δ*copA* Δ*ghsB* (pASK3::*ghsB*) (▼). The growth medium additionally contained 5 µg/L anhydrotetracycline to induce the *tetAp* promoter on the vector. At least three repeats, deviation bars shown.



Supplementary Figure S4. Expression of *gshA* or *gshB in trans* in a Δ*ghsA* or Δ*ghsB* mutant strain, respectively, restores copper resistance under anaerobic conditions. Time-dependent growth curves (37°C in TMM containing 2 g/L glucose, 3 μM $CuCl_2$ and 1 mM ascorbate) were recorded as turbidity at 600 nm in for *E. coli* wild type strain W3110 (●),Δ*copA* (■),Δ*copA* Δ*ghsA* (❍), Δ*copA* Δ*ghsB* (❑), all containing the vector plasmid pASK3, and Δ*copA* Δ*ghsA*(pASK3::*gshA*)(▲), Δ*copA* Δ*ghsB*(pASK3::*ghsB*) (▼). At least three repeats, deviation bars shown.