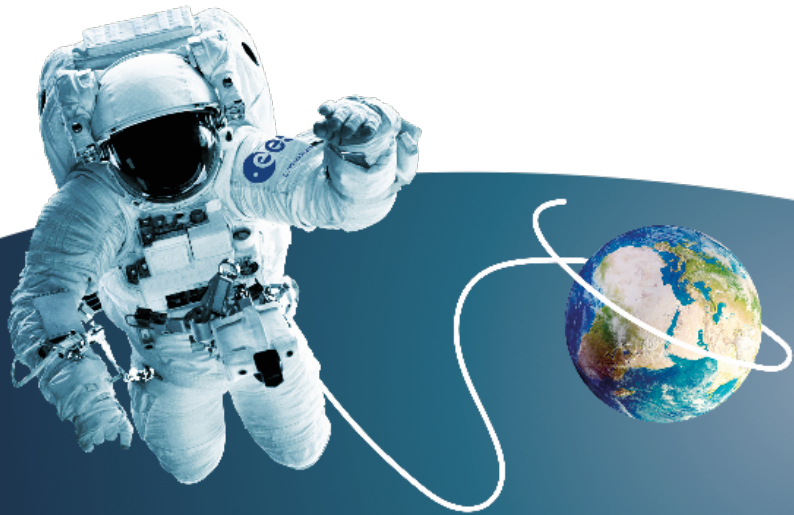




CREATING
A CIRCULAR
FUTURE

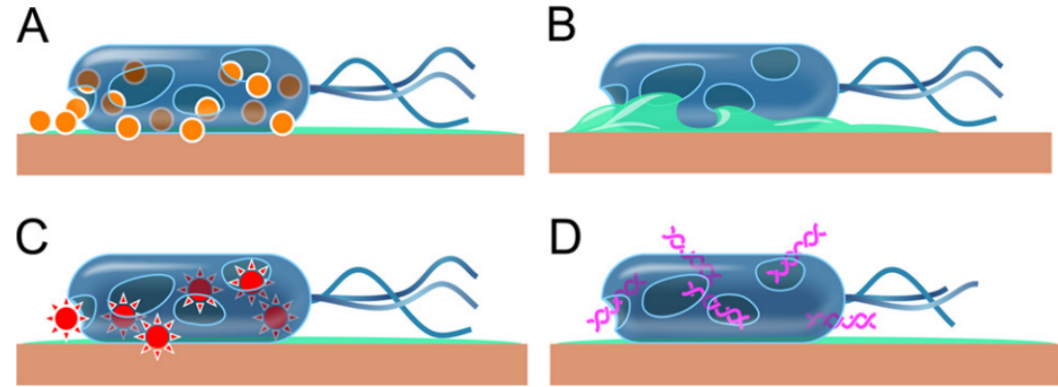
Copper resistance mediates long-term survival of *Cupriavidus metallidurans* in wet contact with **metallic Cu**

Laurens Maertens
SCK CEN & UNamur

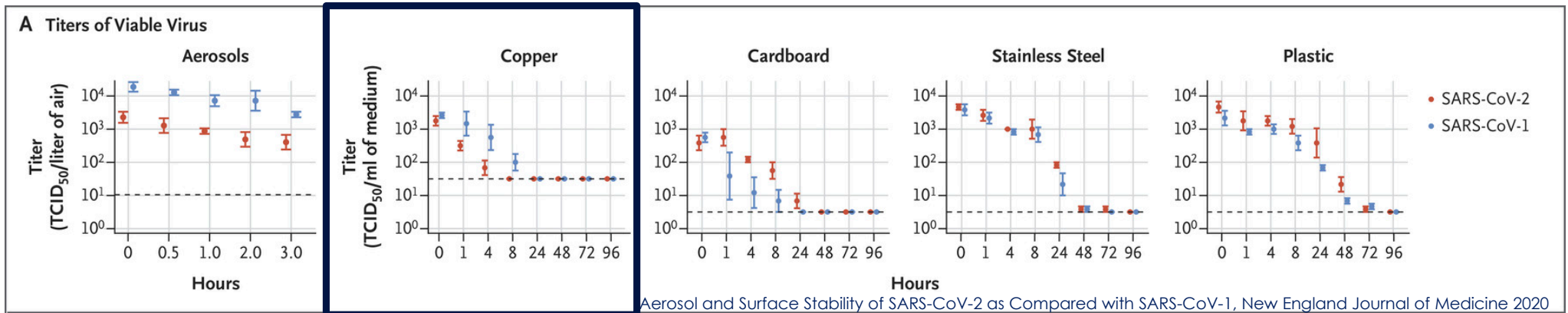




Metallic Cu as an antimicrobial



Metallic Copper as an Antimicrobial Surface, Grass et al., Appl. Environ. Microbiol. 2011

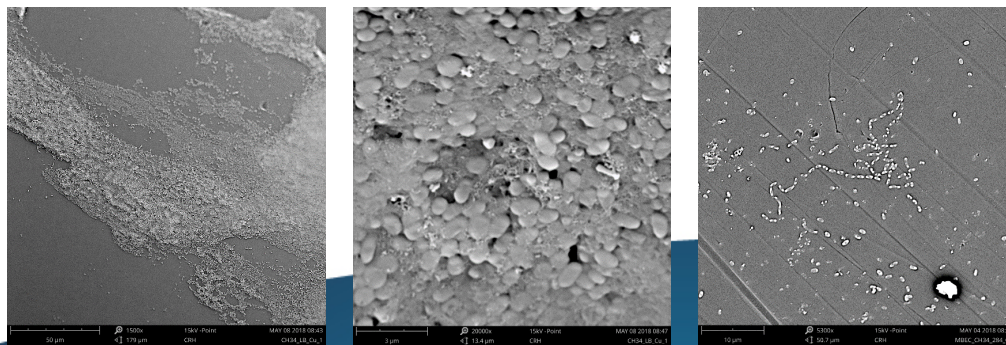




C. metallidurans (in space)

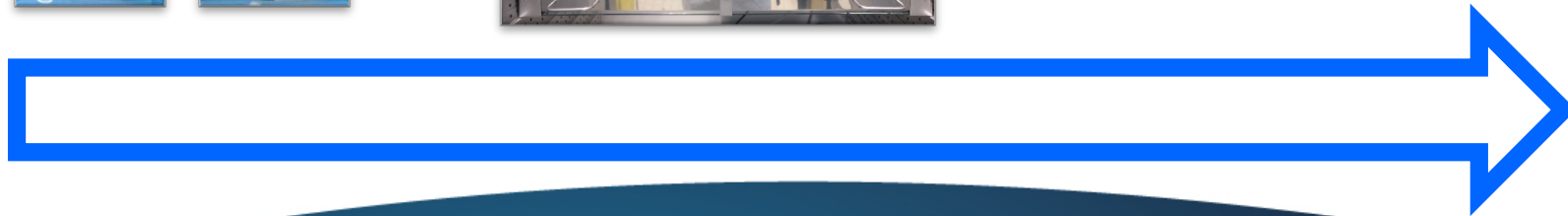
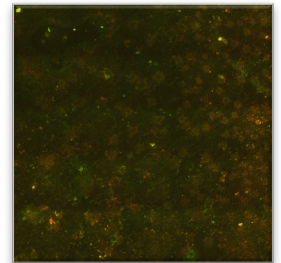
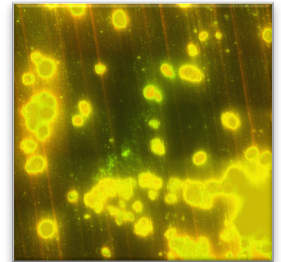
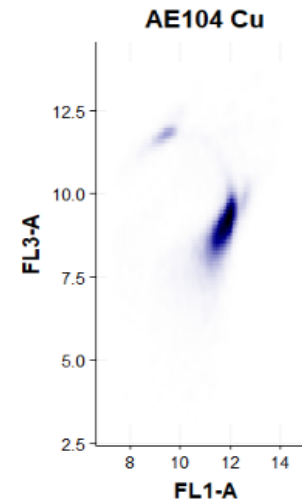
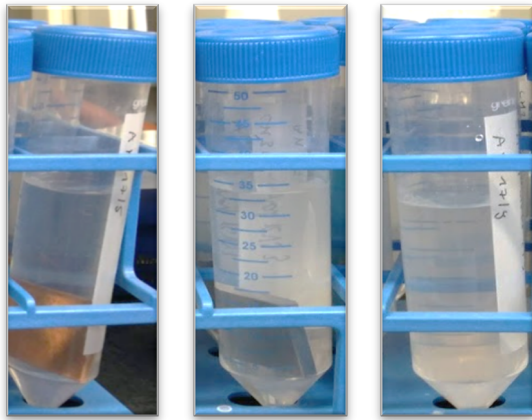
- Extremely metal resistant
- Repeatedly isolated from ISS & Mir
- MESSAGE-1/2 & BASE-A
=> BIOFILMS project

The response of *Cupriavidus metallidurans* CH34 to spaceflight in the international space station, Leys et al., Antonie Van Leeuwenhoek 2009





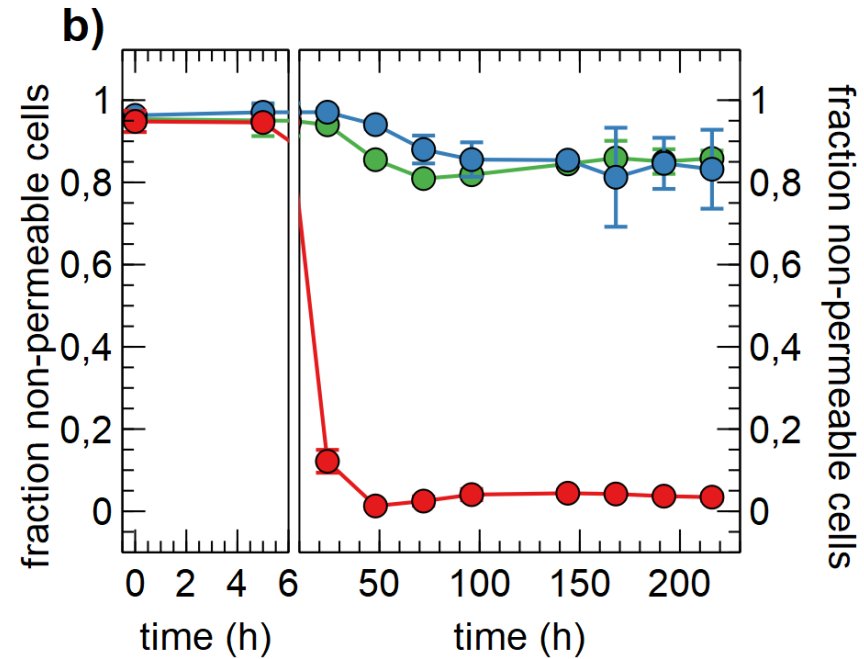
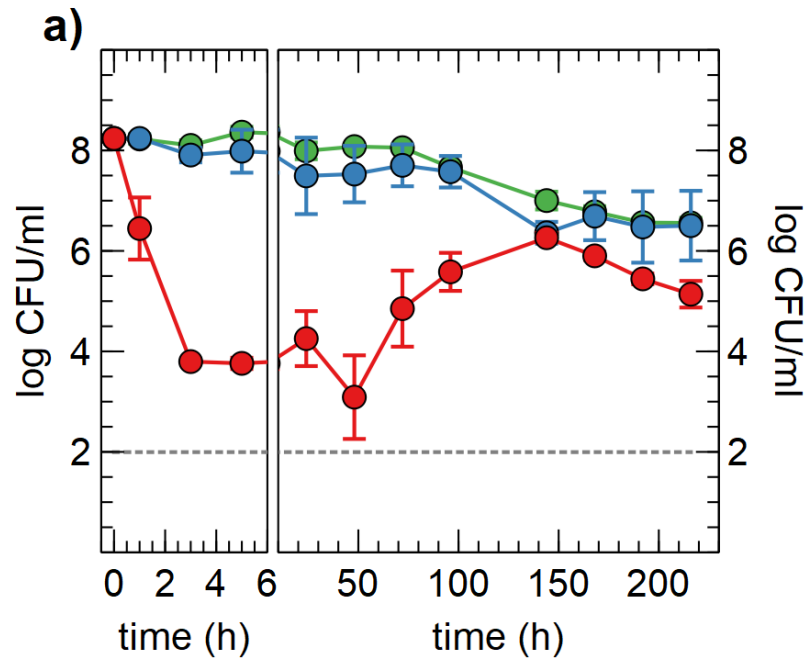
Inactivation kinetics on Cu metal?





Culturability drop and recovery

C. metallidurans CH34

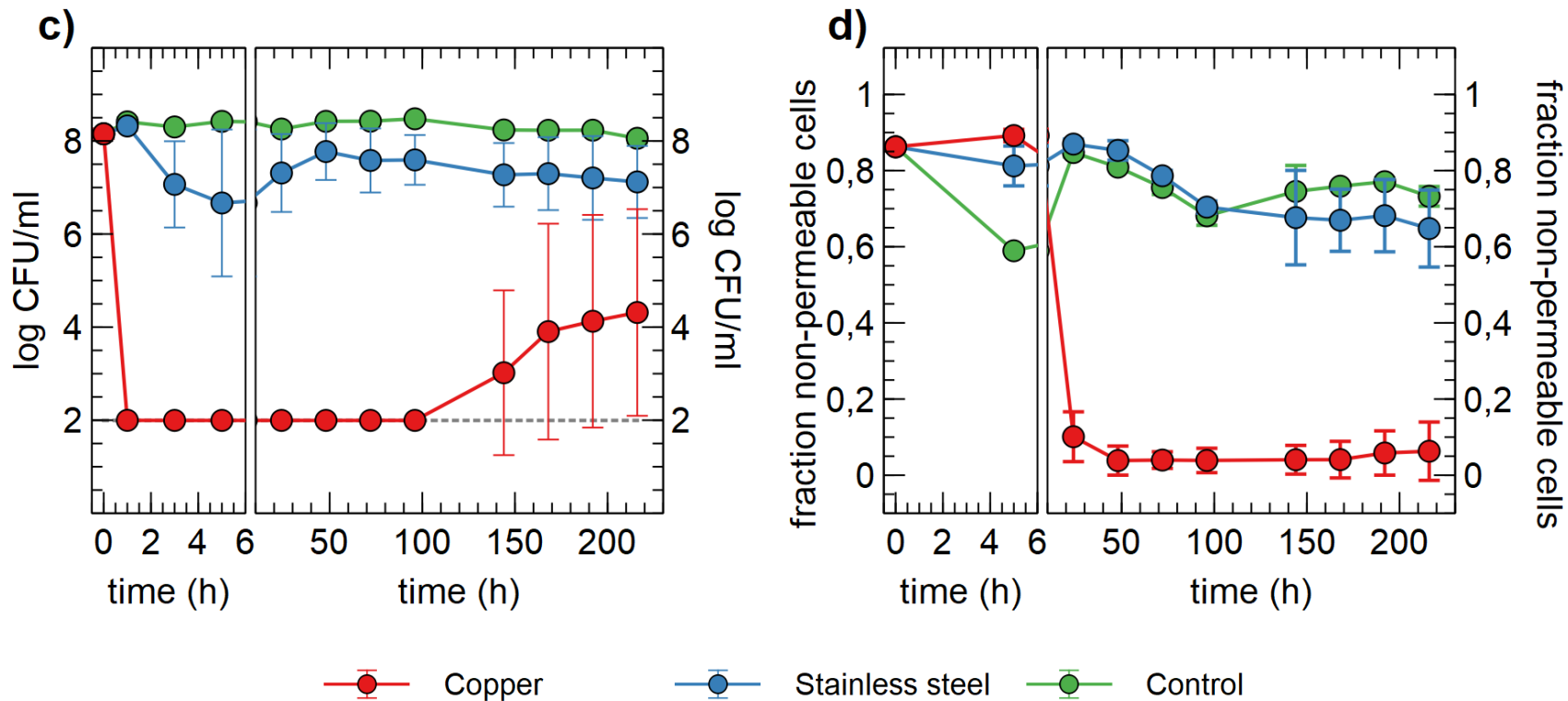


● Copper ● Stainless steel ● Control



Recovery mediated by copper resistance mechanisms (I)

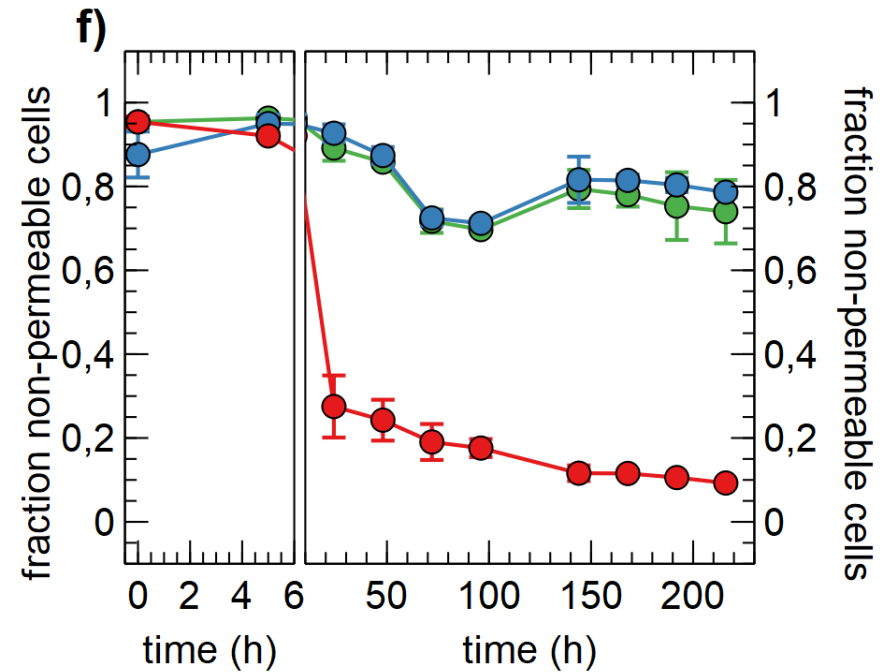
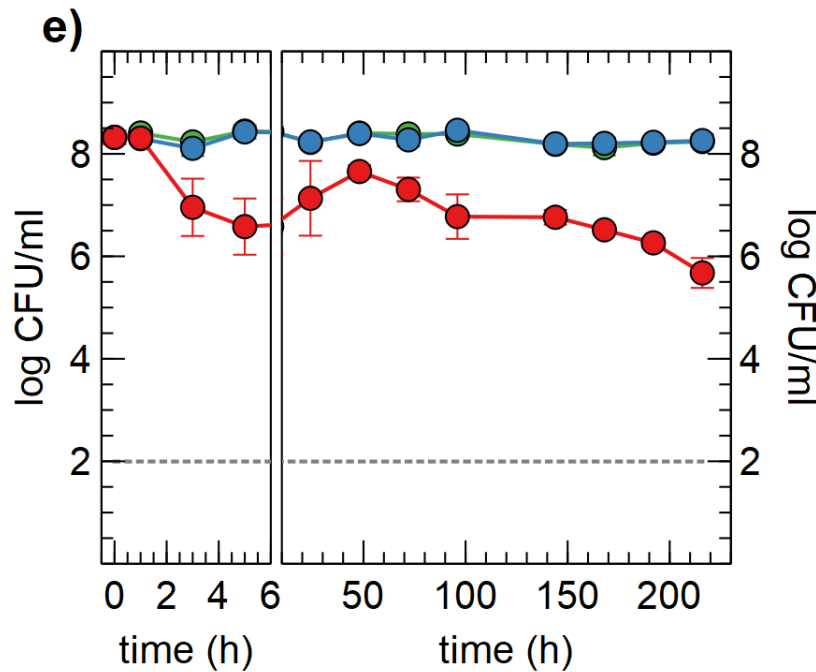
C. metallidurans AE104; no plasmid-bound metal resistance





Recovery mediated by copper resistance mechanisms (II)

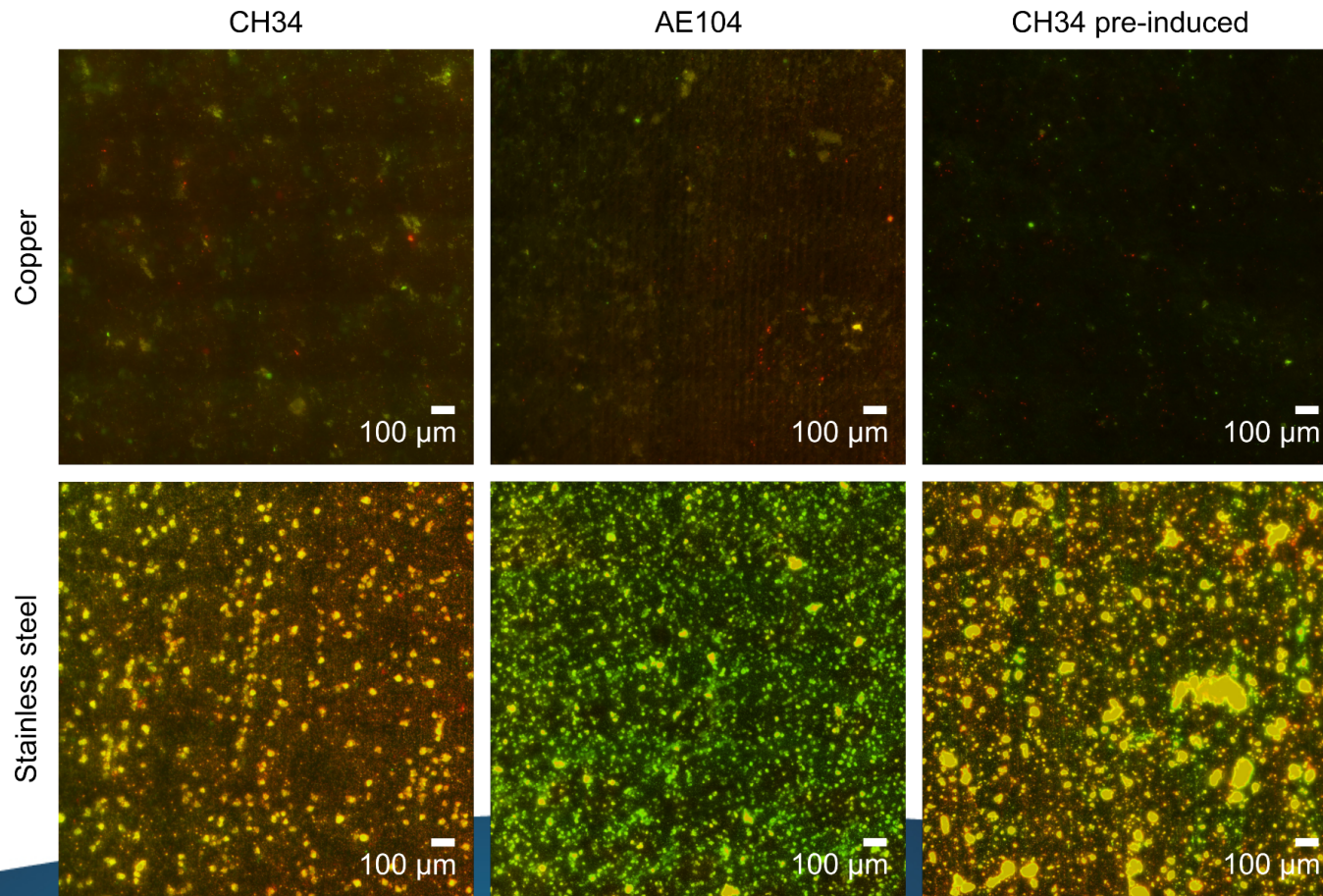
C. metallidurans CH34; pre-induced with CuSO_4



● Copper ● Stainless steel ● Control



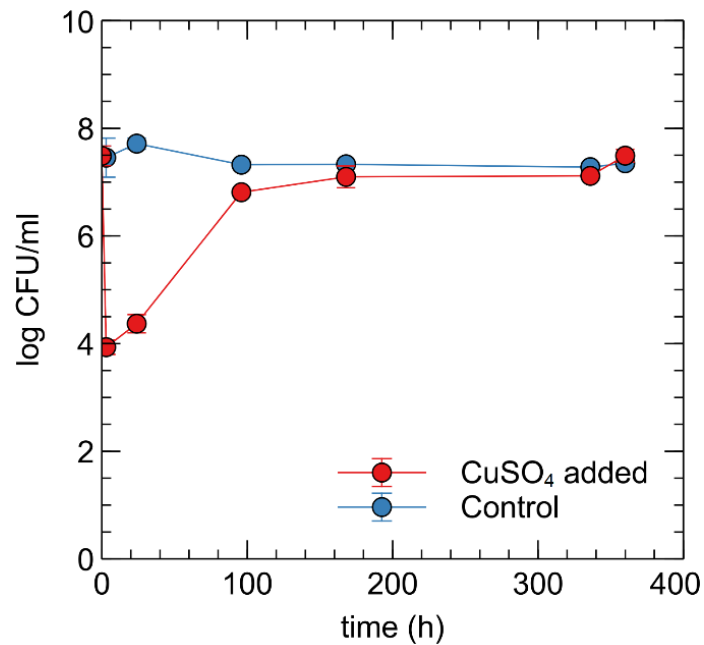
No biofilms formed on Cu





Role of cell-to-metal contact?

C. metallidurans CH34



- Similar inactivation/recovery kinetics
- Resistance or chelation of Cu²⁺
=> Respike & test other strains



Conclusions

- *C. metallidurans* CH34 can survive prolonged exposure to metallic copper upon induction of copper resistance mechanisms
- A conversion to a non-culturable state is suspected to play a role in this survival => culture-based detection methods?
- Can we show the induction of resistance mechanisms in another way?
- Can we characterize this non-culturable state?

MELISSA



MICRO-ECOLOGICAL
LIFE SUPPORT SYSTEM
ALTERNATIVE



Maertens L, Coninx I, Claesen J, Leys N, Matroule JY, Van Houdt R. **Copper Resistance Mediates Long-Term Survival of *Cupriavidus metallidurans* in Wet Contact With Metallic Copper.** *Front Microbiol.* 2020;11:1208. Published 2020 Jun 3. doi:10.3389/fmicb.2020.01208

THANK YOU.

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