



Stopping biofilms before they start: *in vitro* assessment of a silver multilayer coating on orthopedic implant surfaces

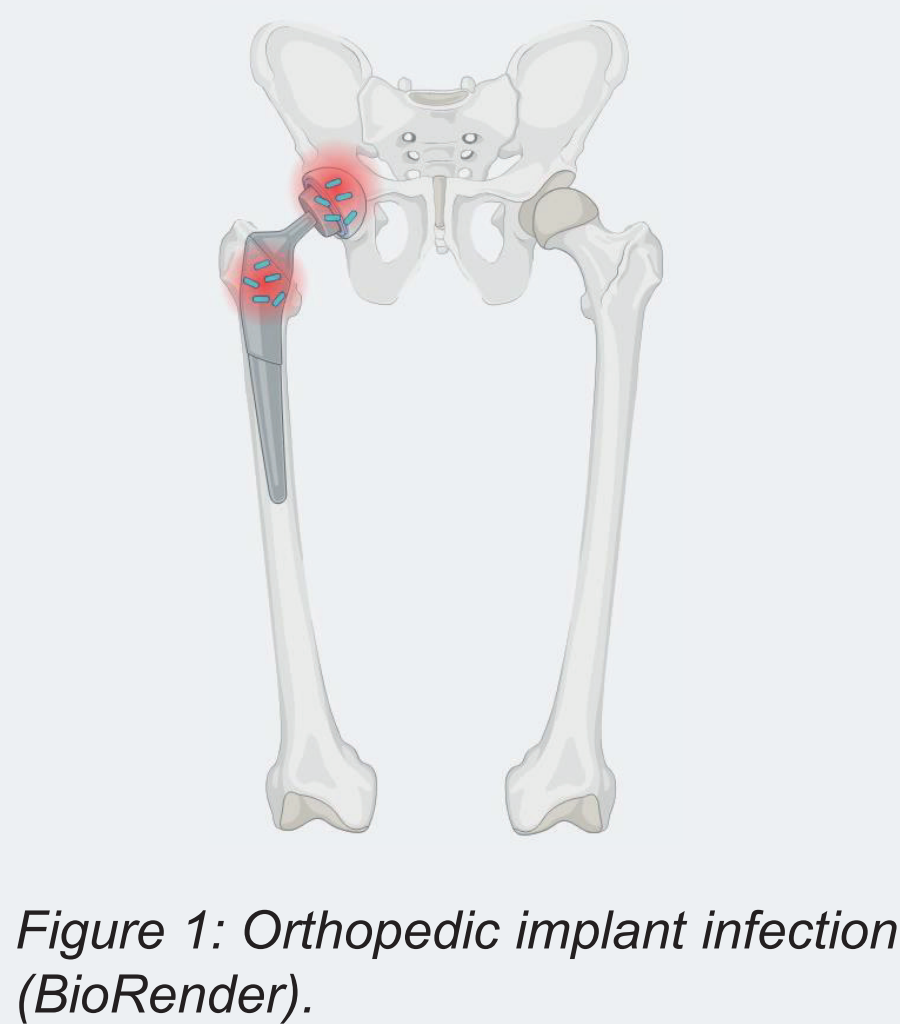
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Background

Prosthetic joint infections (PJI) (figure 1)

- More need for replacement of dysfunctional body parts by prosthetics due to high(er) human life expectancy than ever before¹
- Average incidence of PJI between 0,5-2,0% after surgery², accounts for 13-31% of revision surgeries³
- Silver as preventative strategy for bacterial colonization on orthopedic implants⁴ → silver multilayer coating (SML), HyProtect™ (Bio-Gate)⁵



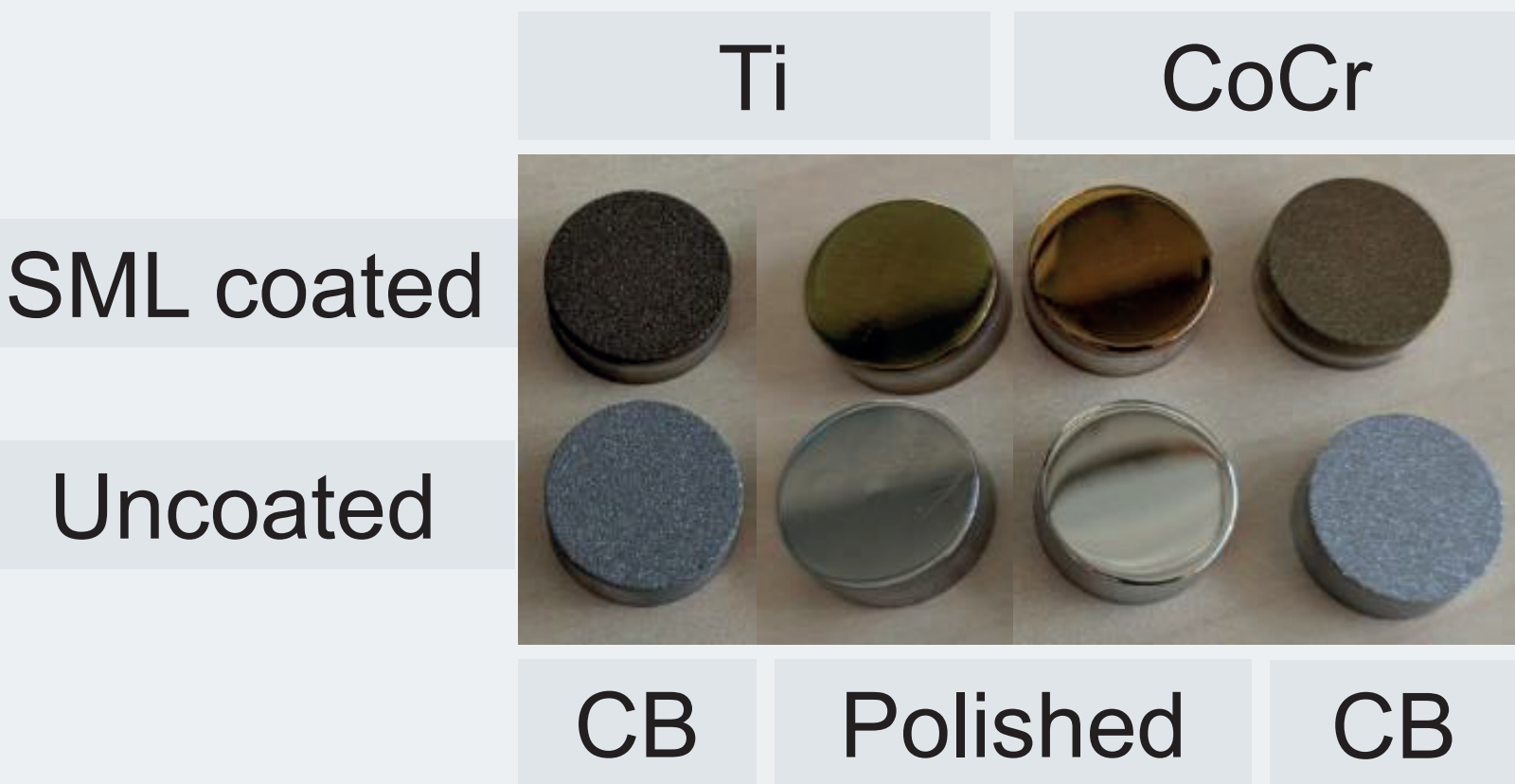
Study objectives

- Evaluate antibacterial performance of SML coating on Titanium (Ti) and Cobalt chromium (CoCr) alloys for Gram-positive and Gram-negative bacteria
- With polished and corundum blasted (CB) surfaces

Conclusions

- SML coating achieved **>99.2%** and **>0.9-4.0 colony forming units (CFU) log₁₀** reduction in viable bacteria
- *S. aureus* and *E. coli* exhibited more CFUs on Ti than on CoCr
- CoCr CB surface yielded lowest levels of bacterial growth for *P. aeruginosa*, whereas *S. epidermidis* grew more extensively on the Ti CB surface.
- Future work: Testing of the efficacy of the SML coating on *S. aureus* clinical strains of PJI-related infections

Methods



- Three experimental groups:
 - Immediate retrieval uncoated, 24 hour incubation uncoated, 24 hour incubation SML-coated
- Microorganisms used:
 - *S. aureus* ATCC6538p
 - *S. epidermidis* ATCC35984
 - *P. aeruginosa* ATCC15442
 - *E. coli* ATCC8739

Results

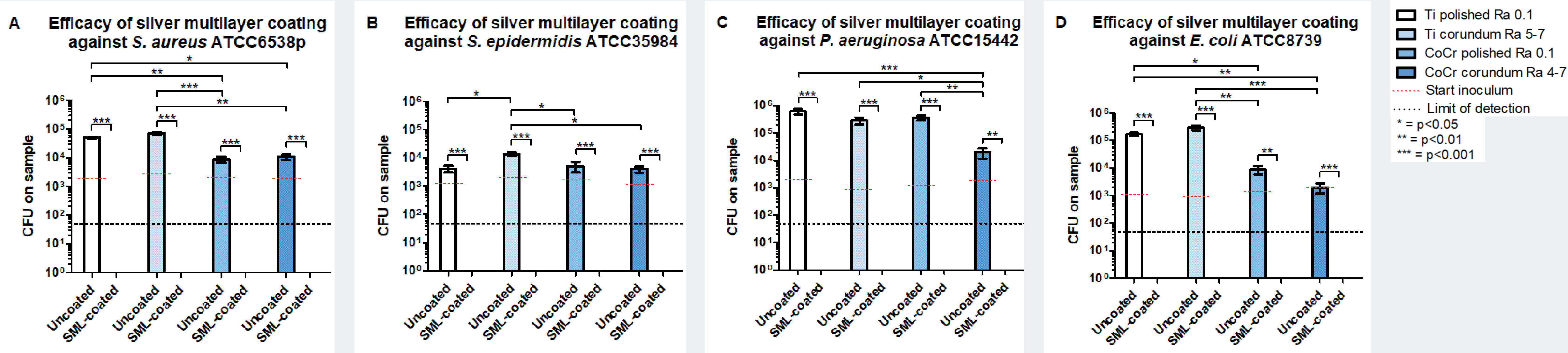


Figure 2: Efficacy of SML coating, surface, and material on the reduction of bacterial growth of four bacterial species: *S. aureus* (A), *S. epidermidis* (B), *P. aeruginosa* (C), *E. coli* (D). Bars represent the mean colony forming units (CFU) of three independent experiments performed in triplicate (n=9 per condition). Error bars indicate the standard error of the mean. Abbreviations: SML = silver multilayer; Ti = titanium alloy; CoCr = cobalt-chromium-molybdenum alloys; Ra = surface roughness average; ATCC = American Type Culture Collection.

References

¹ Kurtz, S. et al., The Journal of bone and joint surgery (2007) <https://doi.org/10.2106/JBJS.F.00222>; ² Weinstein, E. J., et al., JAMA network open (2023). <https://doi.org/10.1001/jamanetworkopen.2023.40457>; ³ Perfetti, D. C. et al., The Journal of arthroplasty (2017). <https://doi.org/10.1016/j.arth.2017.02.027>; ⁴ Ezzariga, N., et al., Cureus (2025). <https://doi.org/10.7759/cureus.78673>; ⁵ Fabritius M, et al., Materials (Basel). 2020; <https://doi.org/10.3390/ma13061415>