



Antibacterial testing on plaster surfaces



Pre-weathering of samples at controlled climatic conditions at 25 °C cycling the relative humidity:

4 h: 90 % RH; 2 h: <5 % RH; 16 h: 90 % RH; 2 h: <5% RH

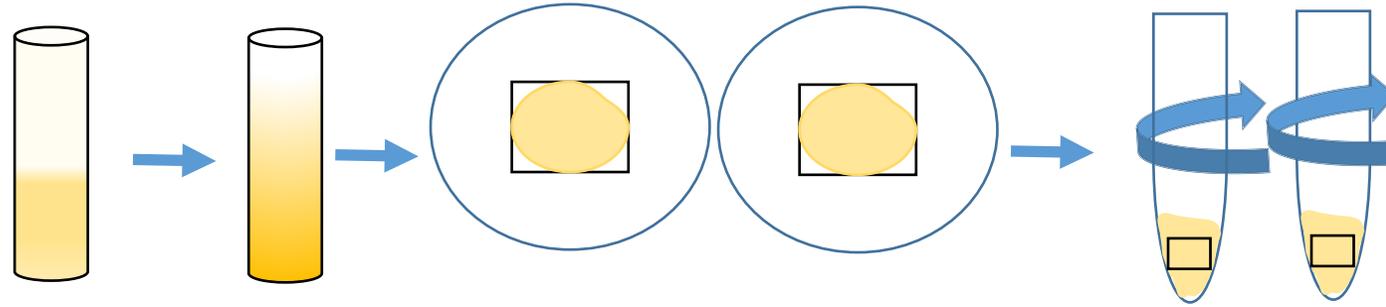
Artificial sweat sprayed once a day for 4 weeks

Samples (triplicates) collected after 1 day, 1 week, 2 week and 4 week

Antibacterial properties investigated for all samples after 20 min and 24 h using a bacteria concentration of OD=0.1 of *E.coli* and *Bacillus subtilis*



Antibacterial properties - Experimental set-up



Overnight culture
Diluted Culture (OD=0.1)

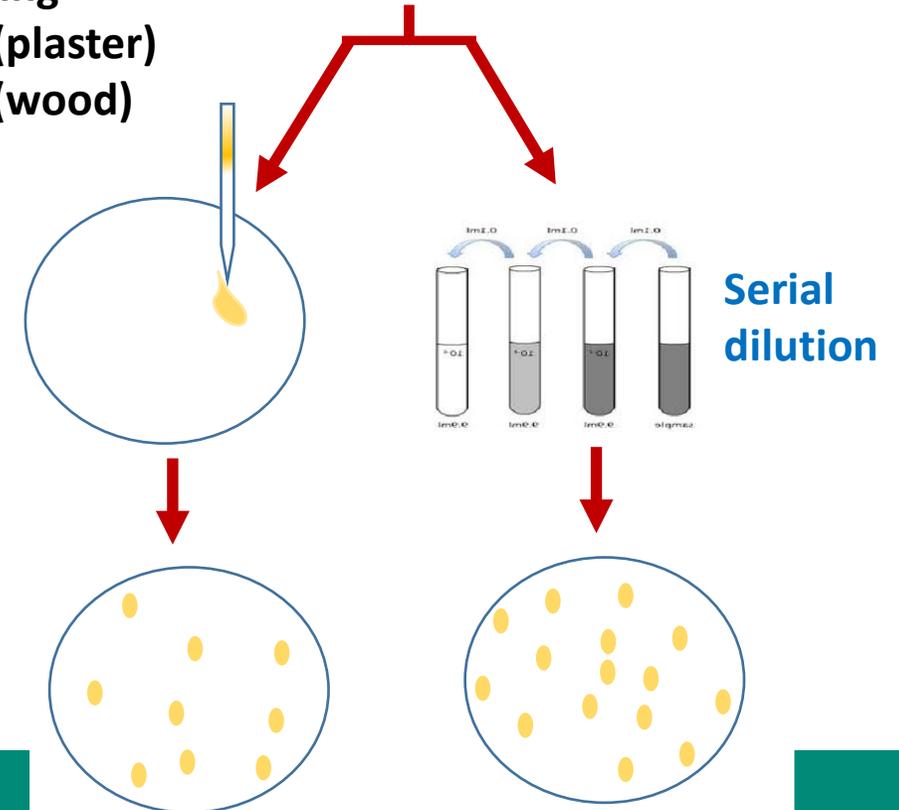
Bacteria seeded
*(20 min and 24 h)

Vortexing
1 min (plaster)
2 min (wood)

 Plaster surfaces *E. Coli*,

Bacillus subtilis

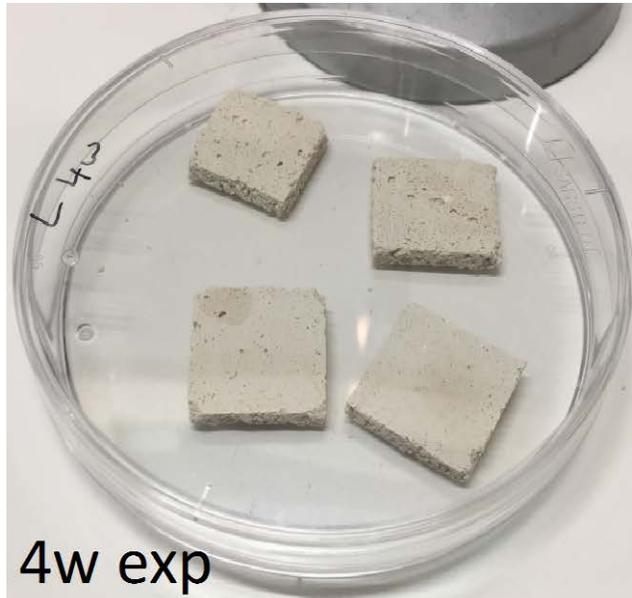
*The time of exposure is selected based on the antibacterial effects of the copper/copper alloy in benchmark experiments



Growth of live bacteria

Antibacterial properties – Plaster

Complete plaster dissolution in ASW during vortexing (1 min)
Rapid sedimentation of plaster particles Lime > Clay



Antibacterial properties (*E-coli*, Plaster – clay)

Complete antibacterial effect after 20 min

(OD 0.1)	Plaster-Clay					
	20 min			24h		
	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction
<i>Escherichia coli</i>						
Samples/exposure conditions						
Number of bacteria	2.2x10 ⁸					
Control - bacteria on glass surface (15 µL)	3.1x10 ⁷	14%				
Control - bacteria on unexposed surface	6.0x10 ³	0,0%	100%	10	0%	100
1 day - cyclic exposure only (no sweat)	4.1x10 ⁵	0,2%	99,8%	0	0%	100
1 day - artificial sweat deposition	7.6x10 ⁴	0,0%	100%	10	0%	100
1 week - cyclic exposure only (no sweat)	6.6x10 ⁵	0,3%	99,7%	20	0%	100
1 week - artificial sweat deposition	7.1x10 ⁵	0,3%	99,7%	700	0%	100
2 weeks - cyclic exposure only (no sweat)	4.3x10 ⁵	0,2%	99,8%	10	0%	100
2 weeks - artificial sweat deposition	8.9x10 ⁵	0,4%	99,6%	10	0%	100
4 weeks - cyclic exposure only (no sweat)	5.7x10 ⁵	0,3%	99,7%	40	0%	100
4 weeks - artificial sweat deposition	4.7x10 ⁵	0,2%	99,8%	10	0%	100

Antibacterial properties (*Bacillus*, Plaster – clay)

Almost complete antibacterial effect after 20 min

(OD 0.1)	Plaster-Clay					
	20 min			24h		
<i>Bacillus subtilis</i>	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction
Samples/exposure conditions						
Number of bacteria	2.3×10^7					
Control - bacteria on glass surface (15 μ L)	1.8×10^7	14%				
Control - bacteria on unexposed surface	>>>	0,0%	100%	1.1×10	0%	100
1 day - cyclic exposure only (no sweat)	1.6×10^4	0,2%	99,8%	0	0%	100
1 day - artificial sweat deposition	2.0×10^4	0,0%	100%	70	0%	100
1 week - cyclic exposure only (no sweat)	1.3×10^4	0,3%	99,7%	10	0%	100
1 week - artificial sweat deposition	6.0×10^3	0,3%	99,7%	0	0%	100
2 weeks - cyclic exposure only (no sweat)	1.8×10^4	0,2%	99,8%	1.5×10^2	0%	100
2 weeks - artificial sweat deposition	2.5×10^3	0,4%	99,6%	40	0%	100
4 weeks - cyclic exposure only (no sweat)	1.5×10^4	0,3%	99,7%	2.1×10^2	0%	100
4 weeks - artificial sweat deposition	6.4×10^3	0,2%	99,8%	10	0%	100

Antibacterial properties (*E-coli*, Plaster – lime)

Complete antibacterial effect after 20 min

(OD 0.1)	Plaster-Lime					
	20 min			24h		
<i>Escherichia coli</i>	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction
Samples/exposure conditions						
Number of bacteria	2.0x10 ⁸					
Control - bacteria on glass surface (15 µL)	8.6x10 ⁷					
Control - bacteria on unexposed surface	0	0,0%	100%	0	0%	100
1 day - cyclic exposure only (no sweat)	0	0,0%	100%	0	0%	100
1 day - artificial sweat deposition	0	0,0%	100%	0	0%	100
1 week - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
1 week - artificial sweat deposition	0	0%	100%	0	0%	100
2 weeks - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
2 weeks - artificial sweat deposition	0	0%	100%	0	0%	100
4 weeks - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
4 weeks - artificial sweat deposition	2.0x10 ²	0,0%	100%	0	0%	100

Antibacterial properties (*Bacillus*, Plaster – lime)

Almost complete antibacterial effect after 20 min

(OD 0.1)	Plaster-Lime					
	20 min			24h		
<i>Bacillus subtilis</i>	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction	CFU/mL (in solution)	Amount of alive bacteria in vortexed solution	Reduction
Samples/exposure conditions						
Number of bacteria	2.3x10 ⁷					
Control - bacteria on glass surface (15 µL)	1.8x10 ⁷					
Control - bacteria on unexposed surface	>>>>>	0,0%	100%	0	0%	100
1 day - cyclic exposure only (no sweat)	0	0,0%	100%	0	0%	100
1 day - artificial sweat deposition	0	0,0%	100%	0	0%	100
1 week - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
1 week - artificial sweat deposition	0	0%	100%	0	0%	100
2 weeks - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
2 weeks - artificial sweat deposition	0	0%	100%	0	0%	100
4 weeks - cyclic exposure only (no sweat)	0	0%	100%	0	0%	100
4 weeks - artificial sweat deposition	2.2x10 ³	0,0%	100%	0	0%	100