FINAL REPORT

Efficacy Testing of Photocatalytic Paint

PROTOCOL
Modified JIS Z2801

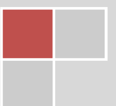
ORDER Number 151707540

PREPARED FOR

AM Technology sa

Via Cantonale 50
6805 Mezzovico Vira-CH
Switzerland
P.Iva CHE262362708

EMSL Analytical, Inc.
5950 Fairbanks North Houston Rd, Houston, TX 77040
Phone: (713) 686-3635 Fax: (713) 686-3645 Web: http://www.emsl.com



Certificate of Analysis

Client: AM Technology sa

Contact: Giorgio Aivazopoulos

Project: Efficacy Testing of Photocatalytic Paint using 375nm UV-Light, Traditional Fluorescent Lighting and no Light (darkness) as Control.

EMSL NO: 151707540

Product: Sheetrock coated with Photocatalytic Paint (Airlite)

Samples received: 11/3/2017

Report date: 12/15/2017

Challenge Bacteria:
Methicillin Resistant *Staphylococcus aureus (MRSA) (*ATCC33592)
Escherichia coli (ATCC 25922)
Pseudomonas aeruginosa (ATCC27853)
Clostridium difficile (ATCC70057)

Experimental Summary:
The testing procedure was designed after discussions between EMSL Analytical, the testing company, and the client, AM Technology sa. The testing procedure follows JIS Z2801 with minor modifications (as detailed below in the method), the testing was conducted on photocatalytic paint coated samples. The testing was conducted in our Houston, TX Microbiology Laboratory.

Test Method:

Culture preparation: One loop of preserved *MRSA* (ATCC 33592), *E. coli* (ATCC 25922) and *P. aeruginosa* (ATCC27853) were first plated separately onto tryptic soy agar supplemented with sheep blood (TSAB) and incubated at 35°C for 24 hours. A well isolated colony was transferred into tryptic soy broth (TSB) and incubated for 20 hours at 35°C. One loop of the test bacteria was transferred and plated onto TSAB. Two loopful of well isolated colonies were then harvested, suspended in 20 mL of 1/50 TSB. This suspension was diluted with 1/50 TSB and adjusted to ~ $10X10^6$ CFU/mL.
Clostridium difficile was grown on Tryptic Soy Agar with 5% sheep (TSAB) and incubated under anaerobic conditions at 35°C for 48 hours. A well isolated colony was then transferred into 10 mL Reinforced Clostridial Medium (RCM) broth and incubated anaerobically for 48 hrs. One loop of *C. diff* was transferred

and plated onto TSAB and incubated anaerobically for 72 hrs at 35 °C. Two loops of bacteria were transferred and dispersed into 20 mL of 1/50 TSB. This suspension was diluted with 1/50 TSB and adjusted to ~ $10X10^6$ CFU/mL.

Inoculation of test material: AM Technology sa submitted 5X5 cm sheetrock samples with photocatalytic paint (Airlite) applied to the surface. These were sanitized using UV light 24 hours prior to any testing. 700 uL of sterilized de-ionized water were added to each piece. The water was evenly distributed using sterilized L-shaped spreaders and allowed to air dry in a biological safety cabinet. Individual test and control samples were placed in 47-mm sterile Petri dishes. Each test sample was inoculated with 400 µL of bacterial suspension as prepared above. All test samples were incubated at 25°C for 4 hours with UV light on, traditional fluorescent lighting, or no light (darkness) as control. All tests were performed in triplicate.

To determine the starting population, a 0.4 mL aliquot of the bacterial suspension was placed into 10 mL of sterile dilution water. A 1-mL aliquot of this solution was then taken and serially diluted. Dilutions were plated onto aerobic plate count Petrifilm plates to determine starting inoculum populations.

Recovery of test organism: The following exposure time points were evaluated: 0 (instantaneous) and 4 hours. After treatment, both test and the control samples were removed from the Petri plates and then sampled with a sponge-tipped swab in 1 mL neutralizing broth. The suspensions were then serially diluted and plated onto aerobic plate count Petrifilm plates. These plates were incubated at 35ºC for 24-48 hours before colonies were counted.
For *C. diff* colony, counts were determined by plating 0.1 mL of each dilution using TSAB plates. All the plates were incubated under anaerobic conditions at 35°C for 72-hours.

Experimental Results:

Table 1. Efficacy of a photocatalytic paint against MRSA following 4 hour light treatments compared to initial (T=0) population counts.

Treatment	CFU per sample (average of 3)	Log CFU	Log Reduction	Percent Reduction
Untreated Time 0 control	8.57.E+06	6.9		
UV Light for 4-hours	1.39.E+04	4.1	2.8	99.84
Fluorescent Light for 4-hours	5.63.E+03	3.8	3.2	99.93
No Light for 4-hours	1.77.E+05	5.2	1.7	97.94

Table 2. Efficacy of a photocatalytic paint against *E. coli* following 4 hour light treatments compared to initial (T=0) population counts.

Treatment	CFU per sample (average of 3)	Log CFU	Log Reduction	Percent Reduction
Untreated Time 0 control	1.93.E+07	7.3		
UV Light for 4-hours	3.33.E+00	0.5	6.8	99.99998
Fluorescent Light for 4-hours	6.33.E+01	1.8	5.5	99.9997
No Light for 4-hours	1.00.E+01	1.0	6.3	99.99995

Table 3. Efficacy of a photocatalytic paint against *P. aeruginosa* following 4 hour light treatments compared to initial (T=0) population counts.

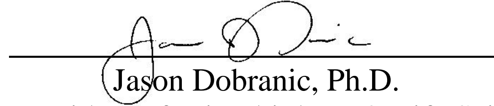
Treatment	CFU per sample (average of 3)	Log CFU	Log Reduction	Percent Reduction
Untreated Time 0 control	4.30.E+07	7.6		
UV Light for 4-hours	1.67.E+01	1.2	6.4	99.99996
Fluorescent Light for 4-hours	4.67.E+01	1.7	6.0	99.9999
No Light for 4-hours	3.33.E+00	0.5	7.1	99.999992

Table 4. Efficacy of a photocatalytic paint against *C. diff* following 4 hour light treatments compared to initial (T=0) population counts.

Treatment	CFU per sample (average of 3)	Log CFU	Log Reduction	Percent Reduction
Untreated Time 0 control	3.83.E+05	5.6		
UV Light for 4-hours	1.32.E+03	3.1	2.5	99.7
Fluorescent Light for 4-hours	1.56.E+03	3.2	2.4	99.6
No Light for 4-hours	1.57.E+05	5.2	0.4	59.0

Conclusions:

The Airlite paint demonstrated antimicrobial properties against MRSA, *E. coli, P. aeruginosa,* and *C. diff* under different lighting conditions for 4 hours compared to the initial starting concentration of the bacteria.



Jason Dobranic, Ph.D.
Vice President of Microbiology & Life Sciences