




Antimicrobial Systems

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Functional materials and nanomaterials for application in health and environment

Editor of Chemical Engineering Journal;
Scientific and editorial board member of international journals and conferences;
More than 150 publications, More than 300 conference papers; 50 plenary, keynotes and invited talks.
11 Inventions with 30+ patents.
Grant reviewer for UK-EPSC, European-ERC/Framework6/7, Singapore-A Star
U.S.-Small Business/Petroleum Research Fund



7 BILLION
REASONS TO THINK ABOUT
HEALTH AND ENVIRONMENT

Hong Kong

1997	H5N1	2003	SARS	2009	H1N1
					

Each year, about one billion people worldwide suffer from influenza infection with fatalities reaching half a million. These figures will further increase whenever a new strain of virus emerges...



Stopping disease transmission is therefore critical for individual and community health...



Smart Anti-Microbial Coating

Simple and easy to use



Simple and easy to use

Fast and effective: rapidly inactivates and kills virus, bacteria and spores on contact



Long lasting: minimum 30 days in 1 application

Smart : self-disinfect on touch and contamination

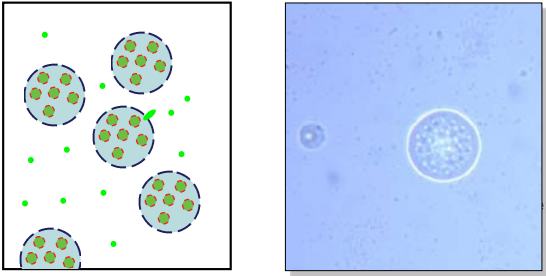


Safe and environmentally friendly



Smart Anti-Microbial Coatings

Anatomy of the Multilevel Anti-Microbial Formulation



The diagram on the left shows several spherical particles, each containing smaller green dots, representing a multilevel formulation. The micrograph on the right shows a single spherical particle with a textured surface, likely representing the coating's structure.

Simple and Easy to Use

Sprayed-on Formulation

↓

Coating on Surface



The photograph on the left shows a grey door with a vertical crease, representing the surface where the coating is applied. The micrograph on the right, labeled "1000 x", shows a detailed view of the coating's surface, which appears as a porous, interconnected network of yellowish-brown structures.

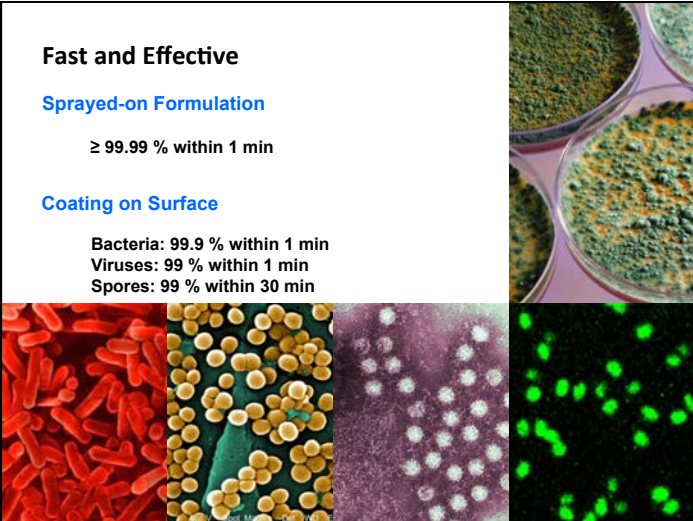
Fast and Effective

Sprayed-on Formulation

≥ 99.99 % within 1 min

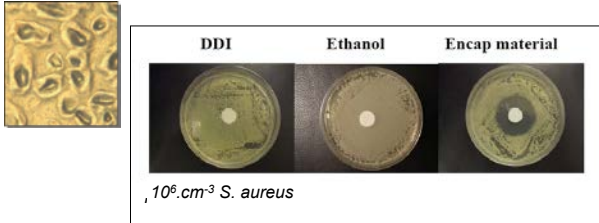
Coating on Surface

Bacteria: 99.9 % within 1 min
Viruses: 99 % within 1 min
Spores: 99 % within 30 min



The top right shows a petri dish with a dense green bacterial culture. The bottom section contains four micrographs: red rod-shaped bacteria, yellow spherical bacteria, purple spores, and green fluorescent bacteria.


Long Lasting



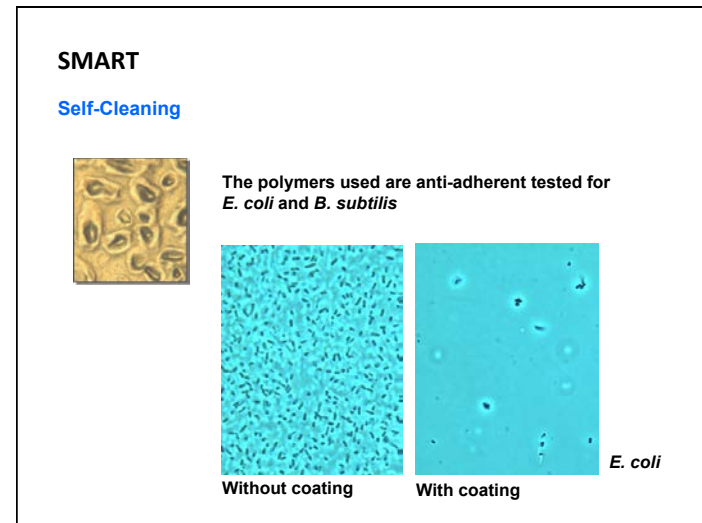
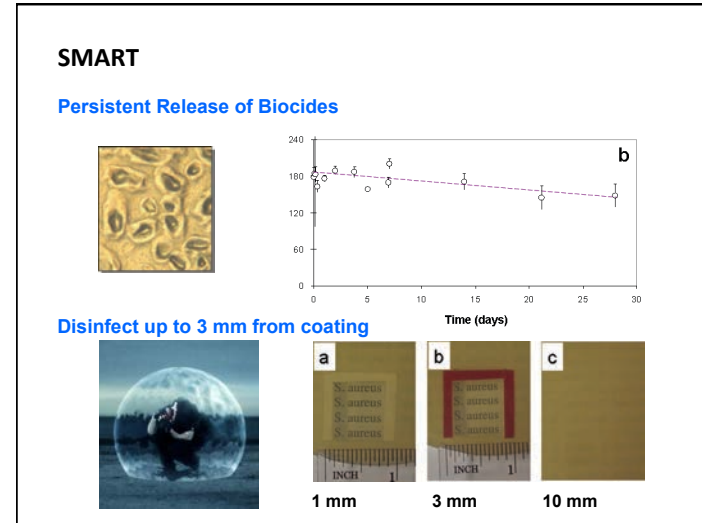
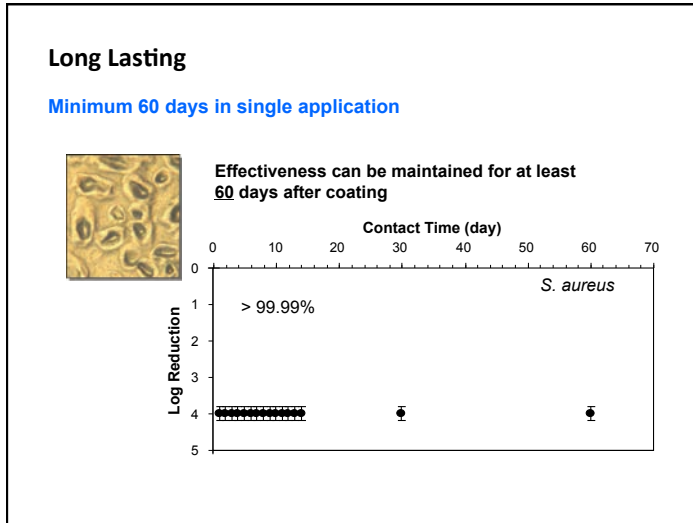
The micrograph on the left shows a dense population of *S. aureus* cells. The petri dishes on the right show the results of a spot assay for 10^6 cm^{-3} *S. aureus* on three different materials: DDI, Ethanol, and Encap material. Each dish shows a distinct zone of inhibition, indicating that the coating effectively kills the bacteria.

DDI Ethanol Encap material

10^6 cm^{-3} *S. aureus*




The bottom row shows four images of cleaning products: a white jug of Ultra bleach, a clear bottle of hand sanitizer, a yellow spray bottle of Lysol disinfectant, and a brown bottle of disinfectant.



Field Test

January 2011




Smart Anti-Microbial Coatings

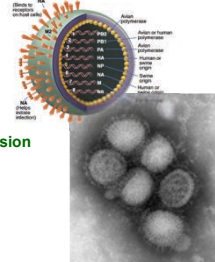
Virucidal Properties

No cytopathic activity after 1 min contact with coated plates...


99 % inactivation after 1 min contact with coated plates...

HK Department of Health, Virus Division

廣州呼吸疾病國家重點實驗室
廣州醫學院第一附屬醫院
廣州呼吸疾病研究所





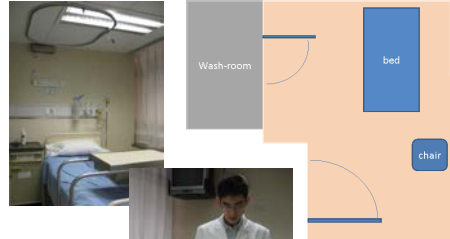


H1N1 human swine flu virus
H3N2, human RSV, EV-71



TMH Field Test

January 17 to April 12, 2011

Dr. T.L. Que
Dr. Eric Yip

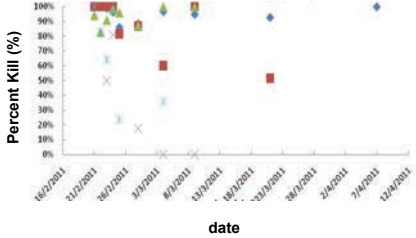






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Field Test


Contamination by Touch

56 days



Date	Handrail (%)	Side table (%)	Side cabinet (%)	Light switch (%)	Door handle (%)
18/01/2011	~95	~95	~95	~95	~95
21/02/2011	~95	~95	~95	~95	~95
28/02/2011	~95	~95	~95	~95	~95
03/03/2011	~95	~95	~95	~95	~95
08/03/2011	~95	~95	~95	~95	~95
13/03/2011	~95	~95	~95	~95	~95
18/03/2011	~95	~95	~95	~95	~95
23/03/2011	~95	~95	~95	~95	~95
28/03/2011	~95	~95	~95	~95	~95
02/04/2011	~95	~95	~95	~95	~95
07/04/2011	~95	~95	~95	~95	~95
12/04/2011	~95	~95	~95	~95	~95

Challenge by touch (8 or 9 touches per item per day) with gloves contaminated with 0.1 ml 10¹⁰ CFU/cm³ E. coli with 3 min contact.



PMH Field Test

May 11 to 26, 2011

Dr. Ng
Dr. Bosco Lam
Princess Margaret Hospital

Objectives:
Coating efficacy and persistence against MDRO.

Lab tests against MDRO

M-Pseudomonas

IMipenem-Resistant
ACinetobacter

Coating Efficacy

Long-term Study of Coating Performance (12 days)
Long-term Study of Coating Performance (12 days)

Days	MRSA (Log reduction)	Acinetobacter (Log reduction)
1	>99.77	>99.99
2	>99.99	>99.99
3	>99.99	>99.97
4	>99.99	>99.99
5	>99.94	>99.99
6	>99.96	>97.88
7	>99.99	99.58
8	99.75	98.93
10	93.52	>98.38
12	98.77	98.14

Challenged with 10⁶ MDRO and sampling by swabbing after 10 min contact. Please note reduction is calculated against control surface without coating.

Clinical Field Testing (QEH)

January 17 to March 28 2011

Dr. Dominic Tsang
Dr. Chris Lai
Queen Elizabeth Hospital

ICU computers

Clinical Field Testing (QEH)

January 17, 2011 (on-going)

Summary of 4 weeks study at ICU wards (>400 samples, >1200 analysis)

MDRO

keyboard mouse



September 9, 2010 Press Conference