

## List of safety properties, antibacterial and antiviral tests of “Cerami.D.A” (Earth Plus)

### ■ Results of each material / bacterial species in anti-virus test

Classification	Scope of application	Contents of the test	Subject	Result (Adsorption decomposition rate) <small>*Shortest time described</small>	Academic basis	Testing organization / evaluation target
Material / Lab	Non-woven fabric	Virus adsorption decomposition test	Influenza virus(H3N2)	2 hours later / 99.99%	Doc.1	Shinshu Ceramics Co., Ltd. Virus Bacteria Laboratory
	Non-woven fabric		Influenza virus(H1N1)	2 hours later / 99.99%	Doc.2	
	Polyester fabric			1 hours later / 99.99%		
	Polypropylene fabric			2 hours later / 99.99%		
	Cotton fabric		Influenza virus(H3N2)	1 hours later / 98.76%	Doc.3	
	Cotton fabric			3 hours later / 99.95%		
	Non-woven fabric		Feline calicivirus	1 hours later / 95.83%		3 hours later / 99.66%
		Coronavirus(SARS-CoV-2)	2 hours later / 99.99%	Doc.45	Japan Textile Products Quality Technology Center	

### ■ Results of each material / bacterial species in anti-virus test

Classification	Scope of application	Contents of the test	Subject	Result (Adsorption decomposition rate) <small>*Shortest time described</small>	Academic basis	Testing organization / evaluation target
Material / Lab	Non-woven fabric / Cotton fabric	Bacterial adsorption decomposition test	S. aureus / ATCC29213	3 hours later / 99.99%	Doc.4	Shinshu University School of Medicine
			S. aureus / CBI	6 hours later / 98.00%		
			S. aureus / CBI MRSA	6 hours later / 96.83%		
			E. coli / ATCC25922	1 hours later / 99.99%		
			E. coli / CBI	3 hours later / 99.70%		
			E. coli / CBI ESBL production	3 hours later / 99.99%		
			P. aeruginosa ATCC9027	1 hours later / 99.99%		
			P. aeruginosa / CBI	1 hours later / 99.99%		
			P. aeruginosa / CBI MBL production	1 hours later / 98.00%		
	Cotton fabric	Bacterial adsorption decomposition test	S. aureus	significantly different	Doc.5	SAMS Shinshu Univ
				24 hours later / 99.99%	Doc.6	JFRL
			E. coli	significantly different	Doc.5	SAMS Shinshu Univ
				24 hours later / 99.99%	Doc.6	JFRL
			P. aeruginosa	significantly different	Doc.5	SAMS Shinshu Univ
				24 hours later / 99.99%	Doc.6	JFRL
	Polyester fabric	Bacterial adsorption decomposition test	Ringworm	Image evaluation	Doc.5	SAMS Shinshu Univ
			S. aureus	48 hours later / 99.88%	Doc.7	JFHA
			S. aureus	18 hours later / 99.90%	Doc.8	Hohenstein Institute, Germany
Pneumonia bacillus			18 hours later / 99.90%			
MRSA			18 hours later / 99.90%			

SAMS Shinshu Univ : School of Allied Medical Science Shinshu University  
 JFRL : Japan Food Research Laboratories  
 JFHA : Japan Food Hygiene Association

### ■ Conference / Thesis presentation

- A dissertation by Dr. Charles P. Gerba, Arizona State University Doc.9  
Antibacterial efficacy of TiO<sub>2</sub>/Ag treated fabrics
- Shinshu University School of Medicine Kasuga and Honda Professor's dissertation Doc.4  
Published in academic journal "International Journal of Nanomedicine"  
Bactericidal activities of woven cotton and nonwoven polypropylene fabrics coated with hydroxyapatite-binding silver/titanium dioxide ceramic nanocomposite "earth-plus"
- Journal of the Japanese Society for Infection Prevention and Control(2012) Doc.11
- The Japanese Biological Safety Association(2007) Doc.12
- The Society for Antibacterial and Antifungal Agents, Japan(2004/2005) Doc.13
- Japanese Society of Allergology(1998) Doc.14

■ Safety property test

Oral acute toxicity test *	A test in which rats are given "Earth Plus" and followed up.	Doc.31
Mutagenic and carcinogenic *	A test to confirm the carcinogenicity of "Earth Plus"	Doc.32
Skin sensitization test *	A test to observe the progress of contacting "Earth Plus" with the skin of a guinea pig	Doc.33
Primary skin irritation test *	A test to observe the progress of a textile product processed with "Earth Plus" by contacting it with the skin of a rabbit.	Doc.34
Cytotoxicity test	A test to confirm whether toxic eluate is emitted from "Earth Plus"	Doc.35
Human patch test	A test to observe the progress of a textile product processed with "Earth Plus" by contacting it with human skin.	Doc.36
Textile products formalin test	A test to measure the amount of formalin that comes out of textile products processed with "Earth Plus"	Doc.37

\*Mandatory inspection by "Society of International sustaining growth for Antimicrobial Articles"

**Cleared safety characteristic test.  
No health effects.**

■ Textile product function comparison

	SEK label acquisition display Japan Textile Evaluation Technology Council	Photocatalyst processing display	Earth plus Shinshu Ceramics co.,LTD.	Doc.No.
function	antibacterial	Antibacterial and deodorant	Antibacterial / antiviral / deodorant	1-8 41-42
Strain	MRSA	unknown	MRSA	8
	Staphylococcus aureus		Staphylococcus aureus	4-8
deodorize	none	unknown	Body odor, sweat odor, aging odor Excretion odor / death odor	41-42
Functional conditions	unknown	UV required	Works on a daily / dry basis	9
Duration and efficacy	Bacteria ... 99% in 18 hours	unknown	Bacteria ... 99% in 18 hours	8
			Virus ... 99% in 1 hour	2
			Smell ... 70-90% in 2 hours	41-42
Persistence of effect	Home washing machine 5-10 times	unknown	Home washing machine 100 times	43
Academic basis	unknown	unknown	Academic paper (British medical journal)	4
certification			Cleared German ISO antibacterial standard	8
Illuminance	unknown	unknown	Confirmed antibacterial properties even at 0 LUX illuminance	44

■ Survey on the frequency of cold catches in medical settings [Statistical data (4 years)]

period	2002-2003						2003-2004						2004-2005						2005-2006						average(%)
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	
LTCF e+ Unprocessed	0%	0%	0%	4%	3%	2%	0%	0%	8%	6%	4%	0%	0%	10%	12%	12%	18%	24%	0%	0%	12%	12%	20%	7.6%	
Long-term medical treatment ward e+ Processed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.9%	

e + : Earth Plus (Cerami.D.A)

e + processing target ... Interior (processed on walls, ceilings, curtains, water areas, tiles, drains, etc.)

Ministry of Economy, Trade and Industry "Regional Creation Technology Research and Development Project Cost Subsidy" Grant

Project Research Committee Chair: Shinshu University School of Medicine (at the time of 2002)

■ Letter of recommendation

Masamitsu Oshima Former Professor, Faculty of Medicine, University of Tokyo Director, Institute of Health Sciences  
Toshio Ohashi, Former Dean of Shinshu University School of Medicine, President of the Japanese Lymphatic Society

\* Published in the journal of the Antibacterial and Antifungal Society in 2005