

NSG

GROUP

Pilkington **SaniTise™**

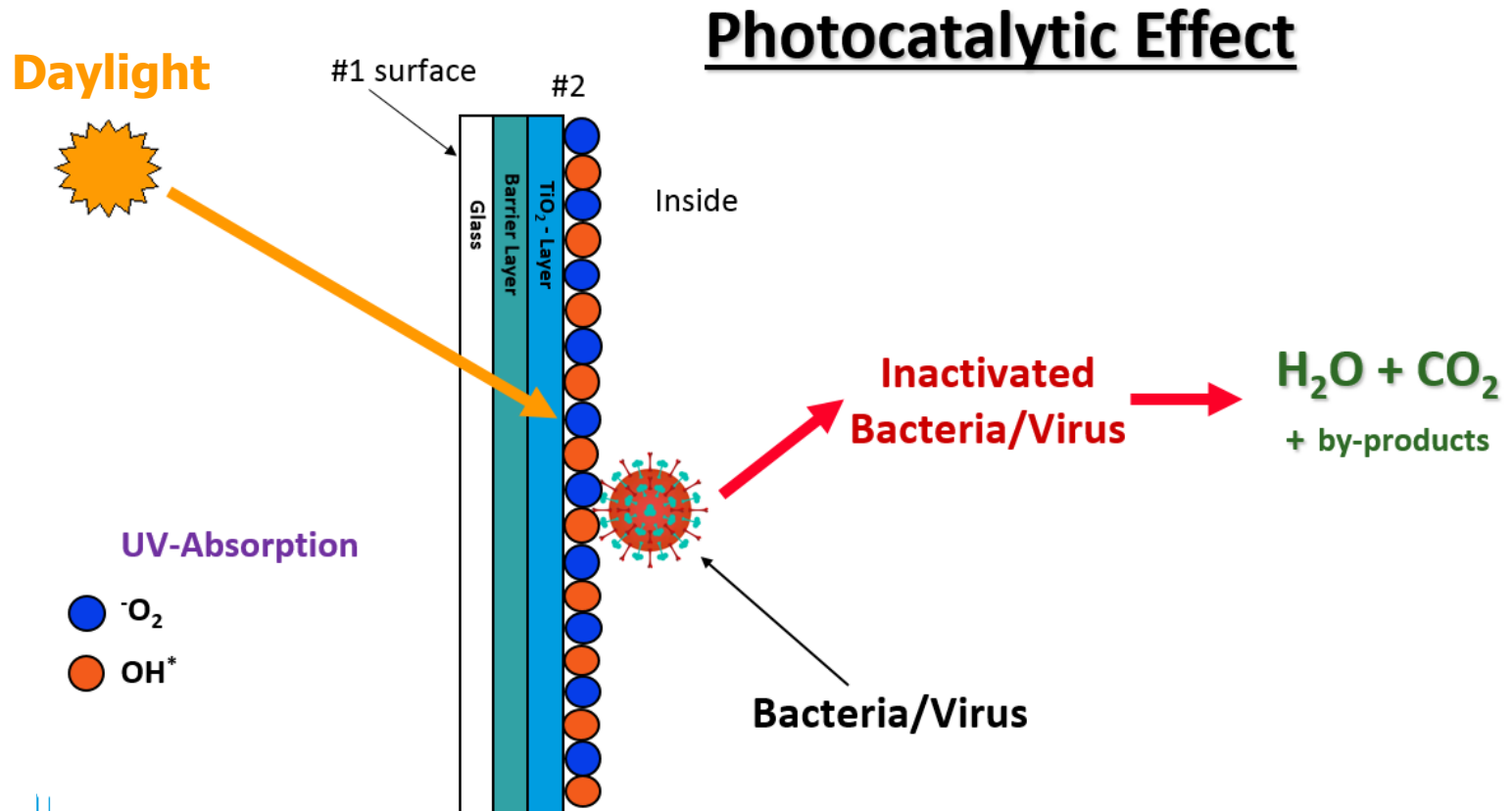
For a healthier, cleaner and safer world

Pilkington **SaniTise™**

- Pilkington **SaniTise™** is a pyrolytic coated glass that provides antimicrobial properties
 - Helps protect against enveloped viruses and bacteria
 - Tested by leading universities and independent laboratories
- Pilkington **SaniTise™** is a TiO₂ photocatalyst, which is naturally activated through exposure to daylight
 - Pilkington **SaniTise™** is a transparent coating, that can be used in all glazing applications with access to UV
 - Pilkington **SaniTise™** is fully temperable and bendable
 - Pilkington **SaniTise™** is highly resistant to corrosion and chemical and mechanical damage

How it works

- Product is a photocatalyst, using UV energy and airborne moisture to generate reactive oxygen species (ROS)
 - It is these ROS which inactivate the viruses and bacteria on the surface of the glass



How it works

- Pilkington **SaniTise™** rapidly achieves its full activity upon exposure to UV light
 - Once activated, Pilkington **SaniTise™** retains activity for at least 2 hours, even in the dark
 - Activation time is dependent on glazing construction
- Pilkington **SaniTise™** is designed to complement existing cleaning regimes
 - Fully compatible with all commercial cleaning products
 - Reduces risk of bacterial and viral transmission
 - Pilkington **SaniTise™** helps to provide a healthier, cleaner and safer environment

Pilkington **SaniTise™**

HM Government

WASH

HANDS

COVER

FACE

NHS

MAKE

SPACE

And install Pilkington **SaniTise™**

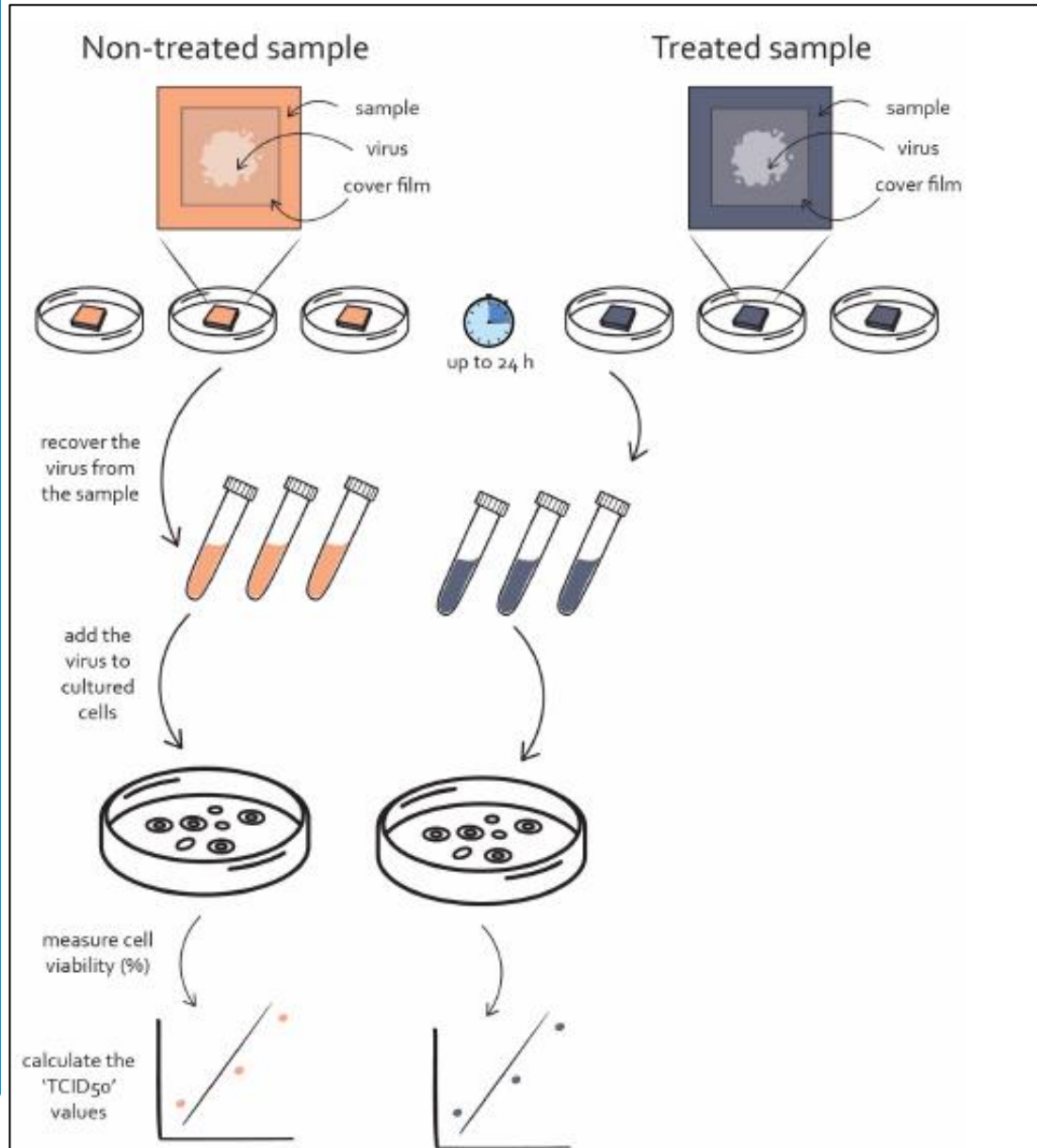
Antiviral testing performance

- The process by which Pilkington **SaniTise™** works is termed photocatalytic disinfection
 - There are a number of literature studies showing the effectiveness of this process with viruses

Viruses affecting humans that have been shown to be destroyed by photocatalytic disinfection	Reference
Hepatitis B	Zan et al. (2007)
Influenza A/H1N1	Lin et al. (2006)
Influenza A/H3N2	Kozlova et al. (2005)
Norovirus	Kato et al. (2005)
Poliovirus Type 1	Watts et al. (1995)
SARS Coronavirus	Han et al. (2004)

- NSG have tested antiviral performance with leading laboratories: ISO Standard 21702 (2019)
 - Measurement of antiviral activity on non-porous surfaces

ISO Standard 21702 (2019)



- Contact time in ISO test is 24 hours
 - Pilkington **SaniTise™** tested at shorter time points to be more relevant for our applications
- TCID₅₀ is viral load remaining on surface after testing
 - Multiple repeats for each test

1. University of Cambridge Tests

- University of Cambridge tested using the following
 - Mouse hepatitis virus: Coronavirus and SARS-Cov-2 surrogate
 - UV illumination: Replicates daylight in average summer conditions
 - Sample pre-activated for 4 hours
 - Tested at 15 minutes and 30 minutes under UV
- University of Cambridge: “Clear evidence of antiviral activity” in Pilkington **SaniTise™**
 - 5 biological repeats provide robust reproducibility

1. University of Cambridge Tests

- For all antiviral testing, product is always compared to a control (uncoated glass)
 - Glass and Pilkington **SaniTise™** irradiated with UVA light
 - After 15 minutes & 30 minutes, Pilkington **SaniTise™** had ~90% viral reduction as compared to glass

	Average TCID50	% vs control	Inhibition vs control
SaniTise - 15 minutes	169	13	87
Glass - 15 minutes	1278	-	-
SaniTise - 30 minutes	13	12	88
Glass - 30 minutes	110	-	-

- Clear evidence of antiviral activity in Pilkington **SaniTise™**
 - Every Pilkington **SaniTise™** sample demonstrated a significant reduction as compared to control

2. University College London (UCL)

- UCL tested using the following conditions
 - Human coronavirus NL63: SARS-Cov-2 surrogate
 - UV illumination at 390 nm
 - Designed not to affect virus
 - Tested at 30 minutes and 60 minutes under UV and also in dark
 - Both conditions after coating pre-activation for 4 hours
- UCL and University of Cambridge testing showed similar performance

2. University College London (UCL)

- After 60 minutes, Pilkington **SaniTise™** had > 80% viral reduction as compared to uncoated glass
 - UV source change, likely reason for reduction in activity

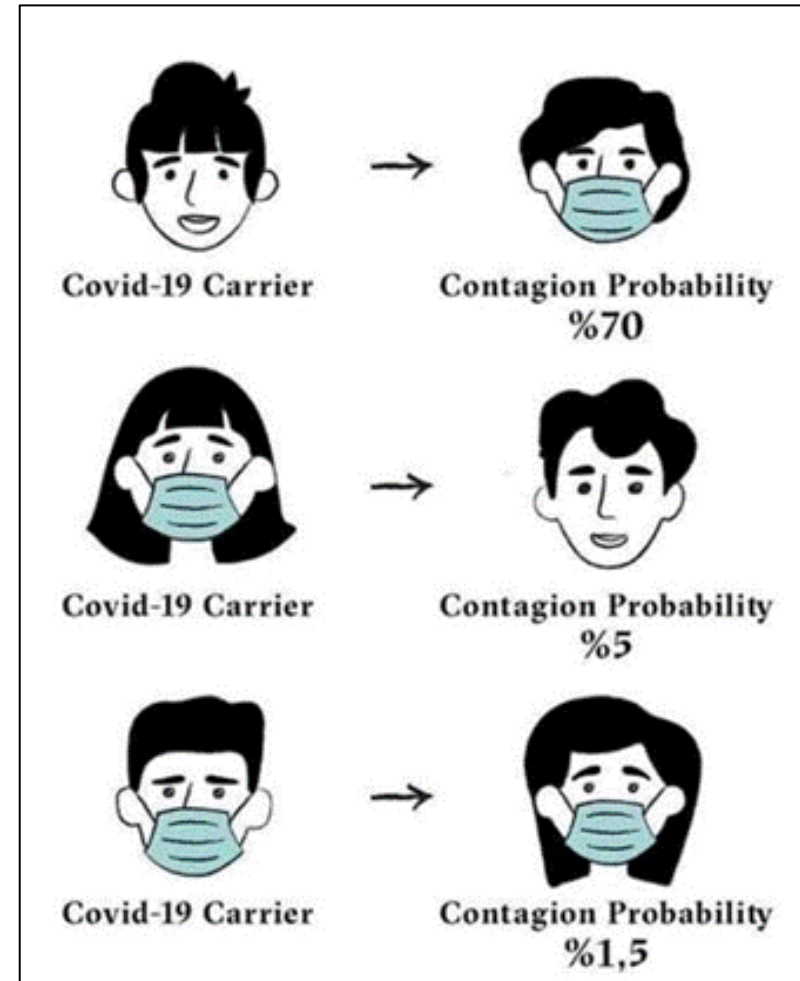
390 nm UV irradiation	Average TCID50	% vs control	Inhibition vs control
SaniTise - 30 minutes	4430	40	60
Glass - 30 minutes	11100	-	-
SaniTise - 60 minutes	2960	17	83
Glass - 60 minutes	17400	-	-

Samples in dark	Average TCID50	% vs control	Inhibition vs control
SaniTise - 30 minutes	2530	23	77
Glass - 30 minutes	11100	-	-
SaniTise - 60 minutes	3060	18	82
Glass - 60 minutes	17400	-	-

- Strong activity retained in dark

Testing conclusions

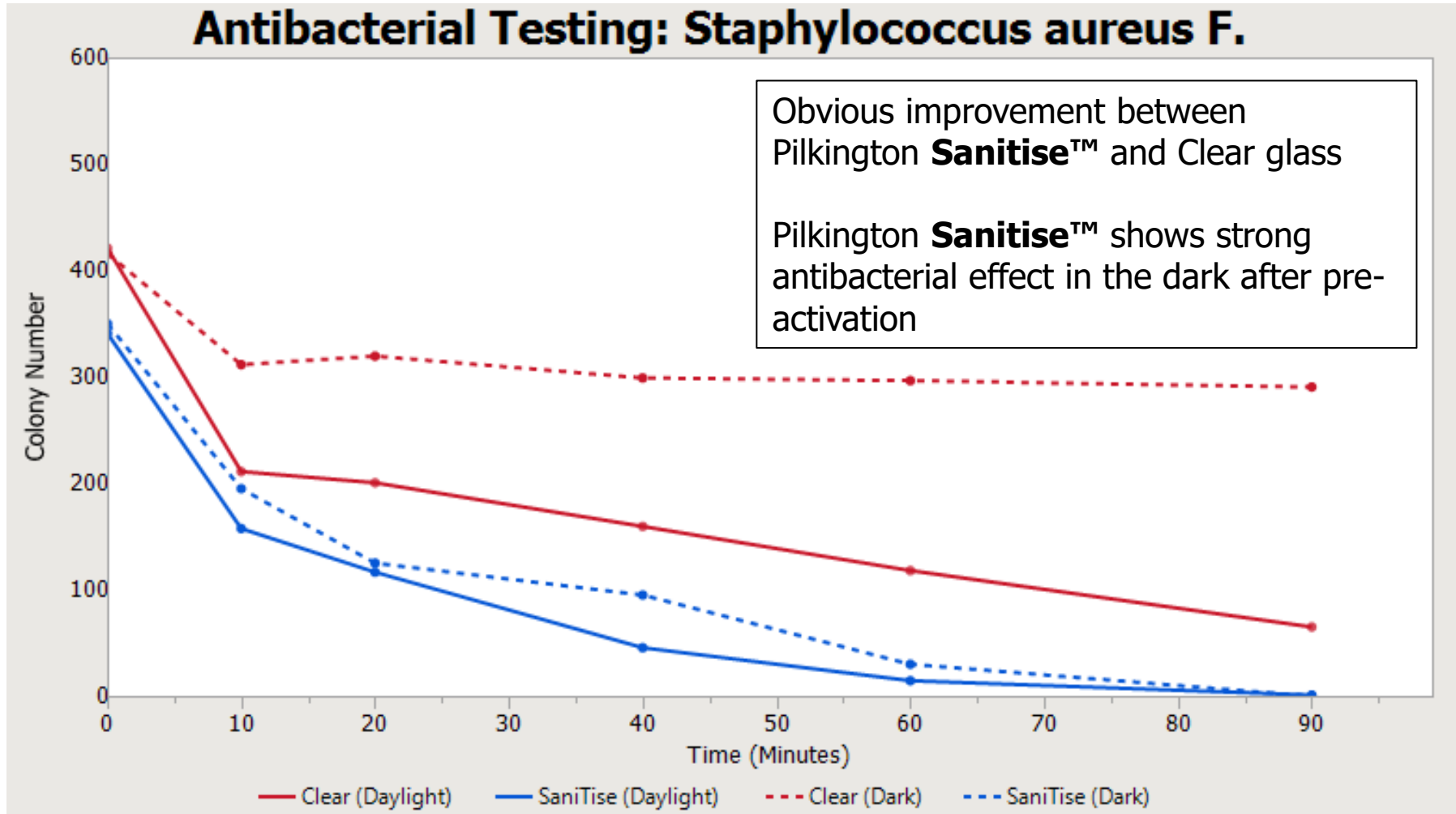
- Like a mask, Pilkington **SaniTise™** significantly reduces the risk of cross infection
- Pilkington **SaniTise™** shows 80-90% viral reduction versus control within 1 hour
 - Daylight conditions: ~90% viral reduction in 15 minutes, versus uncoated glass
 - Non-daylight conditions: > 80% viral reduction in 1 hour, versus uncoated glass,
 - Performance demonstrated in dark



Antibacterial testing performance

- The antibacterial action of photocatalytic disinfection is well documented
- Helix Biotechnology Ltd. carried out performance tests against a number of bacteria with Pilkington **SaniTise™**
 - Some examples shown in next slides are Staphylococcus aureus, E. coli and Pseudomonas aeruginosa (PAO2)
- All Pilkington **SaniTise™** samples pre-activated using UVA irradiation (replicates daylight)
 - All experiments compared to a control (uncoated glass)
 - Experiments performed under UVA and also in dark

Antibacterial testing performance



E-Coli testing performance

- Pilkington **SaniTise™** performance against E-Coli
- Obvious improvement between Pilkington **Sanitise™** and Clear glass
- Pilkington **Sanitise™** shows strong antibacterial effect in the dark after pre-activation

Light	Average bacterial units	% vs control	Inhibition vs control
SaniTise - 10 minutes	188	64	36
Glass - 10 minutes	296	100	0
SaniTise - 40 minutes	0	0	100
Glass - 40 minutes	23	100	0
SaniTise - 90 minutes	0	100	0
Glass - 90 minutes	0	100	0

Dark	Average bacterial units	% vs control	Inhibition vs control
SaniTise - 10 minutes	257	83	17
Glass - 10 minutes	312	100	0
SaniTise - 40 minutes	34	14	86
Glass - 40 minutes	249	100	0
SaniTise - 90 minutes	0	0	100
Glass - 90 minutes	216	100	0

PAO2 testing performance

- Pilkington **SaniTise™** performance against PAO2 (Pseudomonas aeruginosa)
- Obvious improvement between Pilkington **Sanitise™** and Clear glass
- Pilkington **Sanitise™** shows strong antibacterial effect in the dark after pre-activation

Light	Average bacterial units	% vs control	Inhibition vs control
SaniTise - 10 minutes	13	34	66
Glass - 10 minutes	39	100	0
SaniTise - 40 minutes	0	3	97
Glass - 40 minutes	2	100	0
SaniTise - 90 minutes	0	100	0
Glass - 90 minutes	0	100	0

Dark	Average bacterial units	% vs control	Inhibition vs control
SaniTise - 10 minutes	117	21	79
Glass - 10 minutes	562	100	0
SaniTise - 40 minutes	41	10	90
Glass - 40 minutes	410	100	0
SaniTise - 90 minutes	0	0	100
Glass - 90 minutes	218	100	0

Summary

- Pilkington **SaniTise™** tested using ISO antiviral test
 - 80-90% viral reduction within 1 hour compared to uncoated glass
 - Whether in daylight or in the dark, with pre-activation of the coating
- Pilkington **SaniTise™** demonstrates strong antimicrobial performance against various bacterial strains
 - Different bacteria have different levels of resistance, but Pilkington **SaniTise™** was effective in all cases
- Pilkington **SaniTise™** can be tempered, bent or insulated using standard techniques
 - Durable pyrolytic coating lasts the lifetime of the glass

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