

TEST REPORT



LABORATORY ADDRESS:

Level 4, Block N & O, Faculty of Medicine, University of Malaya
50603 Kuala Lumpur.

Tel: +603-79676670 Email: tidrec@um.edu.my

Website: www.tidrec.com

HEAD OF LABORATORY: Sazaly Abu Bakar, Ph.D., FASc



TEST REPORT NO: TS4-0334		DATE OF ISSUE: 23/03/2021
CUSTOMER DETAILS		
NAME	EVA Energy Sdn Bhd	
ADDRESS	12 Jalan Bandar 20, Pusat Bandar Puchong, 47160 Puchong, Selangor, Malaysia.	
CONTACT	Dr. Steve Siaw & Ms. Iris Chew	
SAMPLE & TEST INFORMATION		
JOB NO.	TS4-0334	
DATE RECEIVED	01.12.2020	
TEST PERFORMED	18.02.2021	
ENVIRONMENTAL CONDITIONS	Ambient Temperature: Store below 30°C Relative Humidity: NA	
TYPE OF SAMPLE	1) QuantumG™ Coated fabrics with QR-TAC Series. Active ingredients: Titanium Dioxide, Silver, Copper Ion and Tourmaline 2) QuantumG™ Coated fabrics with Copper Ionic QR-C series Active ingredients: Copper Ion	
SAMPLE ID.	Lot No: FRT/2020/11 Coating Date: 21/11/2020 EXP Date: 20/11/2022	
TEST METHOD (TM) <i>Please tick (✓) at least one TM</i>	✓	ISO18184-2019

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REPORT ON THE QUANTUMG™ COATED FABRICS AGAINST SARS-COV-2 (COVID- 19) ACCORDING TO ISO18184-2019 PROTOCOL

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EXECUTIVE SUMMARY

The QuantumG™ coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric) coated with QR-TAC series & Copper Ionic QR-C series disinfectant were evaluated for its virucidal activity against the SARS-CoV-2, the virus that caused COVID-19 pandemic. The efficacy of the coated fabrics against SARS-CoV-2 were tested by exposing the fabrics to SARS-CoV-2 with contact time of 1-min and 10-min according to the ISO18184-2019 standard. All tests were performed in a Biocontainment Level III Facility of the Tropical Infectious Diseases Research and Education Center (TIDREC), University of Malaya, Malaysia. All procedures strictly adhered to the biosafety procedures and approved protocols. The coated Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric when exposed to SARS-CoV-2, retained $>4 \log_{10}$ reduction in virus titer compared to the controls after 1-minute contact time. This finding suggests that the QuantumG™ coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric), can kill 99.99% SARS-CoV-2 after 1 min contact time.

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EXPERIMENTAL CONDITION

Test period	18.02.2021 – 25.02.2021
Test temperature	21.0°C ± 1°C
Product test concentrations	QR-TAC Series (7%) & Copper Ionic QR-C series (2%)
Contact times	Contact time: 1 min & 10min; Coated: 90 days (Post-spray)
Conditions	Organic Soil (5% FBS)
Diluent for product test solution	Distilled water
Temperature of incubation	37°C ± 1°C, CO ₂ incubator (5% CO ₂)
Virus	SARS-CoV-2
Virus: source	Tropical Infectious Disease Research & Education Centre (TIDREC), University of Malaya, Malaysia
Virus: number of passages	2
Cell line	Vero E6
Cell line: source	ATCC
Cell line: number of passages	Passages 29

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MATERIAL AND METHODS

Cells and viruses

The SARS-CoV-2 used was isolated, propagated and maintained in Vero E6 cells at TIDREC. The Vero E6 cells were cultured in DMEM (Gibco, Grand Island, NY, USA) supplemented with 10% FBS. The cells were maintained at 37°C with 5% CO₂. Virus titers were determined by microtitration using the Vero E6 cells and expressed in TCID₅₀/mL. When cytopathic effects (CPE) were evident under the microscope, the supernatant was harvested, clarified by centrifugation and stored at -80°C until needed.

Cytotoxicity assay

Cytotoxicity assay was performed to determine the toxicity of the coated fabric material to the host cells. Briefly, the coated fabric was washed with the cell culture medium and 10x serial dilution of the medium was performed. The cell culture medium consisting of the coating material, were added to the Vero cells monolayer. The plate was then incubated for 72 and crystal violet dye used to check for cell viability.

Retention of coated fabric with disinfectant spray virucidal effects: Testing for the coated fabric virucidal activity was done by exposing the coated fabric and their respective control to SARS-CoV-2 inoculum according to ISO18184-2019 standard protocol. The coated fabric was exposed to 100 µl of SARS-CoV-2 suspension with virus titer of 5×10^5 and left for 1 min and 10 min contact time. After 1 min and 10 min of contact time, test product activity was neutralized by immediate serial dilution in DMEM supplemented with 2% fetal bovine serum. The mixture was then added to Vero E6 cells maintained in tissue culture plates and the formation of virus cytopathic effects were monitored daily. A mixture of paraformaldehyde and crystal violet were used to fix and stain the infected cells. The virus titers were determined using the Spearman-Kärber method and expressed as tissue culture infectious dose 50% (TCID₅₀/ml). The virucidal activity was determined by the difference of the logarithmic titer of the virus control minus the logarithmic titer of the test virus ($\Delta \log_{10}$ TCID₅₀/ml). A reduction in virus titer of $\geq 4 \log_{10}$ (corresponding to an inactivation of $\geq 99.99\%$) was necessary for claiming virucidal activity of the product.

RESULTS

Cytotoxicity effect of Coated Fabric

Different dilutions of medium consisting of the fabric coating material was added to Vero cells for a

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period of 72 hours. Crystal violet dye was used to check for cells viability. There was no cytotoxicity of the fabric coating material to the cells observed.

Retention of QuantumG™ Coated Fabrics virucidal activity

The coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric) were tested by exposing the fabrics to 100 µl of SARS-CoV-2 inoculum at two different contact times. The virus was recovered by washing the coated fabrics with 2% DMEM cell culture medium and further diluted to neutralize the coating material activity. The TCID50 method was used to determine the virucidal activity of the coated fabrics. Results obtained suggested ≥ 4 log₁₀ reduction in virus titer was observed in all the coated fabrics after 1 min contact time (Table 1). This finding suggests that the QuantumG™ coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric) killed 99.99% SARS-CoV-2.

Table 1: Retention of QuantumG™ QR-TAC Series & Copper Ionic QR-C series Disinfectant Spray virucidal activity on fabric

Samples	Log ₁₀ Reduction in viral titers compared to control	
	Contact time	
	1min	10min
Polypropylene Thermal Bonded Absorbent Non-Woven Fabric	≥ 4.00	≥ 4.00
Polypropylene Spunbond Hydrophobic Non-Woven Fabric	≥ 4.00	≥ 4.00
Water Repellency 100% Polyester Fabric	≥ 4.00	≥ 4.00
100% Polyester Interlock Absorbent Fabric	≥ 4.00	≥ 4.00

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SUMMARY

The virucidal efficacy of QuantumG™ coated fabrics was tested against SARS- CoV-2 for prolong effects of the product following the ISO18184-2019 standard protocol. The QuantumG™ coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric) when exposed to SARS-CoV-2 demonstrated potent virucidal activity of ≥ 4 log₁₀ reduction of SARS-CoV-2 viral titer in 1 min. This finding suggests that the QuantumG™ coated fabrics (Polypropylene Thermal Bonded Absorbent Non-Woven Fabric, Polypropylene Spunbond Hydrophobic Non-Woven Fabric, Water Repellency 100% Polyester Fabric & 100% Polyester Interlock Absorbent Fabric) can kill 99.99% SARS-CoV-2.

PREPARED BY:	APPROVED BY:
 Name: Pouya Hassandarvish Position: Postdoctoral Research Fellow	 Approved Signatory(ies): Sazaly Abu Bakar, Ph.D., FASc <input checked="" type="checkbox"/> Teoh Boon Teong, Ph.D. <input type="checkbox"/> Juraina Abd Jamil, MMedSc <input type="checkbox"/>
Date: March 23, 2021	Date: March 23, 2021

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About TIDREC

The Tropical Infectious Diseases Research and Education Center or TIDREC was established in 2008 to serve as a focal point for national and international collaborative research for academic institutions and research industries in Malaysia. The center was recognized as the Universiti Malaya Center of Excellence (UMCOE) in 2013 and in April 2019 was designated as the Ministry of Higher Education Higher Institution Center of Excellence (HICOE). The center houses the WHO Collaborating Centre for Arbovirus Reference & Research and the Tick Cells Biobank-Asia Outpost. The center is fully equipped with facility to train and undertake research including those involving highly virulent pathogens. In addition to teaching and research, TIDREC also offers services such as reference laboratory diagnostics, drug screening, and validation tests for diagnostic kits. TIDREC is also one of the centers designated by the Ministry of Health of Malaysia to perform the COVID-19 laboratory screening tests. TIDREC is an ISO9001 compliant organization of Universiti Malaya and subscribed to ISO 17025 for its testing services. TIDREC aspires to be an internationally recognized center of excellence in tropical infectious disease research and education that serves the health needs of global communities.

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Appendix



Naming the coronavirus disease (COVID-19) and the virus that causes it

Official names have been announced for the virus responsible for COVID-19 (previously known as “2019 novel coronavirus”) and the disease it causes. The official names are:

Disease

coronavirus disease
(COVID-19)

Virus

severe acute respiratory syndrome coronavirus 2
(SARS-CoV-2)

Source:

[https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)

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Appendix

TIDREC Biosafety Level 3 laboratory (BSL3)

