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Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram 695014, Kerala State, India.
An Autonomous National Institute for Discovery, Innovation & Translation in Biotechnology and Disease Biology,
Government of India, Ministry of Science & Technology, Department of Biotechnology.

राजीव गाँधी जैव प्रौद्योगिकी केन्द्र, तिरुवनन्तपुरम 695 014, केरल, भारत.
जैवप्रौद्योगिकी और रोग जीवविज्ञान में आविष्कार, नवीनता एवं अनुवाद की स्वायत्त राष्ट्रीय संस्थान,
भारत सरकार विज्ञान एवं प्रौद्योगिकी मंत्रालय, जैवप्रौद्योगिकी विभाग.

Determination of Antiviral Activity of Greenlam High Pressure Decorative Laminates against Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)

Rajiv Gandhi Centre for Biotechnology (RGCB)
Bio-Innovation Centre ,KIFRA Film & Video Park, Sainik School Post,
Trivandrum – 695585, Kerala, India

Study Director
Dr. Radhakrishnan R. Nair, Scientist EII

Study Coordinator
Dr. S. Dayakar, Program Scientist

Customer Name: Greenlam Industries Limited
Contact Name: Mr. G.S.R.A. Sharma, Dy. General Manager, QA & Product Development
Email: gsra.sharma@greenlam.com
Phone: +91-01494-220701/02 & M: +9197994 95746
Address: 2nd Floor, West Wing, Worldmark 1,
Aerocity IGI Airport Hospitality District, New Delhi - 110 037
Sample's Information: Greenlam High Pressure Decorative Laminates
Sample Submission Date: 04/10/2020
Study date: 15/10/2020
Report date: 09/11/2020

1. Brief Note on Test Virus SARS-CoV-2

SARS-CoV-2 is a positive-sense, single-stranded RNA (ssRNA), group IV virus. It comprises of four structural proteins, namely, spike (S), nucleocapsid (N) envelope (E), and membrane (M). The S protein is responsible for virus attachment to the receptor and fusion with cell membrane. The N protein interacts with the viral RNA to form the ribonucleoprotein. The E protein helps in virions assembly and comprises ion channel actions; the M protein shares in the assembly of new virus particles. The structural genes of SARS-CoV-2 comprises the S, E, M, and N genes, while the nonstructural genes include the RNA-dependent RNA polymerase (RdRP) and main protease (Mpro) genes

2. Study protocol

- Test panel and control (20mmX 20mm square) sample was obtained from panel source.
- 50 µl of virus (SARS-CoV-2- RGCB Isolate) was spotted on the sheet (Δ Ct 22).
- The samples were incubated for 2 hours.
- 150 µl of neutralization buffer (1X) was added to retrieve the virus.
- RNAase treatment performed as per manufacturers instruction (Genelink,40-5101-01)
- RNA was isolated as per manufacturers instruction (ADT Biotech-Malaysia,811801/811803)
- qRT-PCR was performed to quantify the RNA content using Kit (Real Star SARS-CoV-2 RT-PCR kit 1.0, Altona Diagnostics GmbH-Germany, 023005) as per manufacturers instruction.

3. Sample and experimental details

Sl. No	Sample	Batch Number	Identification marks
1	Greenlam High Pressure Decorative Laminates untreated	B 1035	#113 Suede Finish, 1.0mm, Untreated
2	Greenlam High Pressure Decorative Laminates treated	B 1036	#113 Suede Finish, 1.0mm, Anti-Virus, Anti-Bacterial & Anti-Fungal Treated

Note: Generally, in antiviral efficacy determination protocols, the virus post exposure to the test samples are allowed to grow on mammalian cells and the plaques are counted. This step is modified in the above protocol as growing COVID-19 wouldn't be safe.

4. Study result

In the present study SARS-CoV-2 specific RNA (E&S target gene) was not detected in Greenlam High Pressure Decorative Laminates after 30 minutes of treatment indicating rupturing of viral envelope whereas control sample shows non-significant reduction. It has significantly enhanced the antiviral log reduction and reduces viral RNA infectivity by 99% reduction of virus after 30 minutes. The study was performed as per modified ISO 21702:2019 protocol.

Sl No	Time (min)	Greenlam High Pressure Decorative Laminates treated						Greenlam High Pressure Decorative Laminates untreated					
		SARS-CoV-2											
		E Gene			S Gene			E Gene			S Gene		
		Ct Value*	Delta Ct**	%Reduction in Viral load	Ct Value	Delta Ct	%Reduction in Viral load	Ct Value	Delta Ct	%Reduction in Viral load	Ct Value	Delta Ct	%Reduction in Viral load
1	BE	-	-	-	-	-	-	-	-	-	-	-	-
2	0 min	21	-	-	17	-	-	17	-		13	-	
3	5 min	23	2	-	21	4	-	18	1		14	1	
4	10 min	26	3	>95	23	2	>95	19	1		15	1	
5	30 min	29	3	99	26	3	99	20	1	NS	16	1	NS
6	45 min	-	-	End point	-	-	End point	21	1		16	0	
7	120 min	-	-	End point	-	-	End point	22	1		17	1	
8	PC	28			25			28	-		24	-	
9	NC	ND	-	-	ND	-	-	ND	-	-	ND	-	-

* Mean of triplicates. ** Delta Ct of 3-4 corresponds to 1 log difference. ND-Not detected NS- non-significant PC-Positive control NC-Negative control

BE-Before expose

5. Quality Control:

In accordance with the ISO 15189:2012-certified Quality Management System, each lot of SARS-CoV-2 RT-PCR assay is tested against predetermined specifications to ensure consistent product quality

Dr. Radhakrishnan R. Nair
Study Director

Dr. S. Dayakar
Study Co-ordinator

Ms Heera R. Pillai
Quality Manager