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ASX RELEASE **6 April 2022**

ASX: NVU

Nanoshield™ Antiviral Liquid Spray NEA Listed

Highlights

- **Nanoshield™ Antiviral Liquid Spray ("Liquid Spray") has been listed by the Singapore National Environmental Agency (NEA) as a Self-Disinfecting Surface Coating Product Effective Against Coronaviruses[1].**
- **The listing of the Liquid Spray represents the third Nanoveu product listed by the NEA as a Self-Disinfecting Surface Coating Products Effective Against Coronaviruses. There are only 8 products listed in this category.**
- **Liquid Spray is an alcohol free, eco-friendly, non-toxic, non-flammable and fragrance free spray that eliminates 99% of viruses and bacteria including coronavirus in 15 minutes[2], and is effective for at least 6 months[3].**
- **Liquid Spray is formulated using natural catechins from green tea, contains copper, is highly transparent, deodorising and non-sticky upon application.**
- **A total of 57 products have been evaluated by NEA, in accordance with the criteria as stated in the Technical Guidance on the Testing of Self-Disinfecting Surface Coatings against SARS-CoV-2[1].**
- **Liquid Spray is the only Category A, NEA-listed product that is commercially available off-the-shelf and currently available for sale at Nanoveu's ecommerce site - www.nanoshield.co**

Nanoveu Limited ("**Nanoveu**" or the "**Company**") (**ASX: NVU**) a technology company that has shaped antiviral films through the power of cutting-edge nanotechnology is pleased to announce that the Company's Nanoshield™ Antiviral Liquid Spray ("Liquid Spray") has been listed by the Singapore National Environmental Agency (NEA) as a Self-Disinfecting Surface Coating Products Effective Against Coronaviruses[1].

The listing of the Liquid Spray represents the third Nanoveu product listed by the NEA as a Self-Disinfecting Surface Coating Products Effective Against Coronaviruses, with Nanoshield™ film and Liquid Film / Spray also listed[1].

[1] https://www.nea.gov.sg/our-services/public-cleanliness/environmental-cleaning-guidelines/guidelines/list-of-household-products-and-active-ingredients-for-disinfection-of-covid-19
[2] Appended Report -EVALUATION OF THE VIRUCIDAL PROPERTIES OF COATED NON-POROUS MATERIALS AGAINST CORONAVIRUS - EMERGENT RESEARCH CENTER - NBC Meshtec inc. - 27 January 2022
[3] Appended Report - Durability test of spray-type antiviral coating for TH321 - Innox - 27 January 2021

The Nanoshield™ Liquid Spray is an alcohol free, eco-friendly, non-toxic, non-flammable and fragrance-free spray that eliminates 99% of viruses and bacteria including coronavirus in 15 minutes and is effective for at least 6 months[4] [5].

Nanoveu Founder and CEO, Alfred Chong, commented: "We are very pleased to have our third product listed by the NEA as a Self-Disinfecting Surface Coating Product Effective Against Coronaviruses[1]. With 3 of the 8 products listed by the NEA being Nanoveu products, the Company continues to be recognised by the NEA as the leader in the Singaporean market for antimicrobial and antibacterial solutions and surface coatings."

Liquid Spray is formulated using naturally occurring ingredients, is highly transparent and non-sticky.

Image 1 - Nanoshield™ Antiviral Liquid Spray

- Ends -

[4] Appended Report -EVALUATION OF THE VIRUCIDAL PROPERTIES OF COATED NON-POROUS MATERIALS AGAINST CORONAVIRUS - EMERGENT RESEARCH CENTER - NBC Meshtec inc. - 27 January 2022

[5] Appended Report - Durability test of spray-type antiviral coating for TH321 - Innox – 27 January 2021

This announcement has been authorised for release by the Board of Directors

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About Nanoveu Limited

We are technology innovators who specialize in modern, cutting-edge nanotechnology that improve the way we live, from reducing contagious transmissions on high touch points to immersive vision-based entertainment. https://www.nanoveu.com/

Nanoshield - is a film which uses a patented polymer of Cuprous embedded film to self-disinfect surfaces. Nanoshield antiviral protection which is available in a variety of shapes and forms, from mobile screen covers, to mobile phone cases and as a PVC commercial film, capable of being applied to a number of surfaces such as doorhandles and push panels. The perfectly clear plastic film contains a layer of charged copper nanoparticles which have antiviral and antimicrobial properties. This technology is also being applied to fabric applications targeting use in the personal protective equipment sector.

EyeFly3D - is a film applied to digital displays that allowed users to experience 3D without the need for glasses on everyday mobile handheld devices.

Customskins - are vending machines capable of precisely applying screen covers to mobile phones with an alignment accuracy of 150 microns.

EyeFyx - currently in research and development stage, EyeFyx is a vision correction solution using hardware and software to manipulate screen output addressing long-sightedness without the need to wear reading glasses.

No. 762

EVALUATION OF THE VIRUCIDAL PROPERTIES OF COATED NON-POROUS MATERIALS AGAINST CORONAVIRUS

Prepared for SPONSOR:

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27 January 2022

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1. PURPOSE OF STUDY

The purpose of this study was to evaluate the virucidal activity of PET film surfaces coated with TH321 product when challenged with Coronavirus.

2. SCOPE

This study was adapted and modified from ISO 21702 (Measurement of antiviral activity on plastics and other non-porous surfaces). It was designed to evaluate the virucidal property of TH321 product. The virucidal efficacies of adhesive film samples coated with TH321 were tested. Uncoated adhesive film samples were used as controls in this study.
Human Coronavirus, strain OC43 was inoculated onto the coated test and uncoated control adhesive film surfaces, and incubated at room temperature (25 °C) for 15 minutes. Following the timed exposure, the virus samples were recovered and inoculated onto susceptible Mv1Lu cells for analysis by virus plaque reduction assay. Tests and controls were performed and evaluated in triplicates. The testing procedures are detailed in section 5.

3. JUSTIFICATION FOR THE SELECTION OF THE TEST SYSTEM

The Sponsor has requested an antimicrobial label claim for Coronavirus. OC43, a human coronavirus, was used for testing.

4. TEST MATERIALS

The evaluated test and control materials were provided to the Testing Facility by the Study Sponsor, complete with appropriate documentation. Certificates of Analysis were not provided to the Testing Facility. Responsibility for the determination of the identity, strength, purity, composition, and stability of the test and control materials, as well as the retention of the test and control materials, rests with the Sponsor.

Test materials: PET film samples coated with TH321– without and with abrasion (500 and 1000 rubs).
Receipt Date: 1 January 2022.
Expiration Date: Not Provided.

Control Materials: Uncoated PET film sample (5 x 5 cm).

No. 762

Receipt Date: 1 January 2022.
Expiration Date: Not Provided.

5. METHODS

5.1 Test Conditions

Exposure Time: 15 minutes.
Exposure Temperature: Room temperature (25 °C).

5.2 Host Cell Preparation

The challenge viral strain used was the OC43 strain. Mv1Lu mink lung epithelial cells were used for this study. Cells were maintained as monolayers in disposable cell culture labware. Prior to testing, host cell cultures were seeded into 6-well cell culture plates. Cell monolayers were ~80% confluent, and less than 24-hours old before inoculation with the virus. The culture medium (CM) consisted of MEM supplemented with 10% fetal bovine serum (FBS).

5.3 Test Virus Preparation and Identification

The challenge viral strain OC43 was propagated, stored, and used for this study. On the day of use, aliquots of a stock virus suspension were removed from a -80°C freezer and thawed. The stock virus was diluted to obtain the titer of >1 x 10^5 PFU per 100 µl (for coated and uncoated samples). Virus-specific plaque reduction assay (for viable virus quantification) was performed in Mv1Lu cells susceptible to virus infection.

5.4 Procedures for Simulated Contamination of Test Versus Control Samples

5.4.1 PET film samples coated with TH321

A 100 µl aliquot of the virus inoculum (containing > 1 x 10^5 PFU) was transferred to each PET film sample coated with TH321, and spread over it (by superimposing a clean PET film (4 x 4 cm)), and subjected to exposure times of 15 minutes at 25°C. Controls were performed in a similar manner by adding 100 µl of virus inoculum (containing > 1 x 10^5 PFU) to each uncoated adhesive film sample.

5.4.2 Virus recovery and plaque assay

Each inoculum was individually retrieved by the addition of 10 ml of MEM containing 10% FBS (10%FBS-MEM), and thoroughly mixed before harvesting the retrieved sample for virus plaque reduction assay.

Each harvested sample was serially diluted (10-fold) up to 3 times, and inoculated into the pre-seeded Mv1Lu cells for virus plaque assay. The plates were incubated for 3 days at 37 °C in an incubator with 5% CO_2.
The cells were stained with methylene blue to facilitate visualization of any plaques. Clear plaques (PFU) were counted based on the dilution well with <60 plaques. The viral titers were then back-calculated to account for the dilution factor.

5.5 Calculations

Viral titers were expressed as log PFU/cm^2 for infectivity. Clear plaques (PFU) were counted based on the dilution well with <60 PFU. For example, if 8 plaques were counted at a dilution factor of 10^4, then by dividing the area (16 cm^2) the actual virus titer would be 5 x 10^3 PFU/cm^2 (= 3.70 log PFU/cm^2). Antiviral activity is measured by subtracting the virus titer of the tested sample from the virus titer of the control sample.

6. FINAL RESULTS

Below is the overall summary of the testing results.

Tested and control samples were initially inoculated with 4.36 log PFU/cm^2 of OC43.
Virus recovery from the initial virus inoculum was more than 4.46 logPFU/cm^2.

Sample	Contact time (min.)	Viral titer (log PFU/cm^2)	Antiviral activity	%Reduction
Uncoated control	15	4.28	—	—
TH321 without abrasion		2.32	2.04	99.09
TH321 with abrasion of 500 rubs		2.02	2.34	99.54
TH321 with abrasion of 1000 rubs		2.42	1.94	98.85

Summary: With a contact time of 15 minutes, there was a reduction in viral titer of at least 2.0 log10 relative to the s initial viral titer when the TH321 coating (no abrasion) was applied.

7. SUMMARY

In summary, the application of TH321 with a contact time of 15 minutes resulted in a reduction in viral titer of at least 2.0 log10 compared to the initial viral titer.

8. CONTROL TESTS

Control tests were performed to exclude potential issues of product leaching – including the leached product causing cytotoxicity or continuing to inactivate virus. These tests were conducted using the neutralizer solution of 10%FBS-MEM as specified under section 6.6 of ISO 21702:2019 (with modifications).

8.1 Verification of cell sensitivity to virus and inactivation of antiviral activity

10 ml of 10%FBS-MEM was added to each batch of test specimens, and rinsed thoroughly by pipetting the 10%FBS-MEM at least four times. Three untreated test specimens and three treated test specimens were used for these tests. Then, 5 ml of the 10%FBS-MEM recovered from the test specimens was mixed with 50 µl of the virus inoculum (4-6 x 10^4 PFU/mL), and incubated for 30 minutes at 25 °C. 100 µl of the suspension was inoculated onto Mv1Lu cells in each respective well of the culture plate, and incubated at 37 °C for 1 hour. Subsequently, overlay of 1% agar for plaque assay was added, and incubated for 3 days at 37 °C with 5% CO2. The cells were then fixed and stained with methylene blue to visualize the results.

Sample	Contact time (min.)	Viral titer (log PFU/ml)	$\lvert S_n - S_u \rvert$ or $\lvert S_n - S_t \rvert$
10%FBS-MEM only	30	2.67	–
Untreated control		2.72	0.05
TH321		2.73	0.06

$|Sn - Su| = |2.67 - 2.72| = 0.05 (\leq 0.5)$

$|Sn - St| = |2.67 - 2.73| = 0.06 (\leq 0.5)$

Summary: Using 10%FBS-MEM as neutralizer, these results fulfil the condition for verification of this test.

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[E762-1_durability]

Durability test of spray-type antiviral coating for TH321

1. Purpose and Overview

The durability test of TH321 spray antiviral application was conducted.

2. Tested date

27 January 2022

3. Materials used

Coating solution: TH321

Solvent: Water

Coating Method: Spray coating

Drying method: Natural drying

Curing method: Natural drying

Substrate material: PET film

Spray method: Spray gun using a compressor

4. Sample preparation

1. The object to be applied is PET film. Clean the surface with ethanol before application.
2. After drying ethanol, applications of appropriately diluted TH321 were made using a spray gun.
3. Apply a layer of spray coating so that the surface is evenly distributed.
4. After coating, allow the paint to dry naturally. The drying time was about 60 minutes.
5. A curing time of at least 24 hours was allowed before conducting the durability test.

5. Durability test

The durability test shall be conducted by reciprocating durability test with reference to JIS K 6547 or ISO 20433:2005.

Abrade material: Cellulose nonwoven fabric (BEMCOT® M3)

Tested load: 500g

Abrasion area: 5cm x 20cm

[E762-1_durability]

Abrasion frequency: 1,000 rubs and 500rubs

Abrade speed: 20mm/sec.

Simple detection method: Chlorine decomposition method using HYDRION® Chlorine Test Paper

Efficacy verification method: Antiviral test using OC43 (Report: E762-1_ISO217022019)

6. Method

1. PET film coated with TH321 is placed in the testing machine.
2. Set the weights according to the specified load.
3. Start wear and stop the equipment when the specified number of rubs is reached.
4. Visually inspect the specimen to check for any peeling of the coating or significant wear.
5. A sample is taken from the area where abrasion test was performed and from the area where it was not. 20 µL of 5 ppm hypochlorite water is dropped and allowed to stand for 1 min. HYDRION® Chlorine Test Paper is placed on top of the dropped hypochlorite water and the concentration of free chlorine is measured. The presence or absence of decomposition of hypochlorous acid due to the efficacy of the active ingredient is confirmed by the presence or absence of discoloration of the test paper.
6. From the abrasion area, a 5 cm x 5 cm sample was cut to perform the antiviral test using OC43. Refer E762-1_ISO217022019 report for details.

7. Result

No significant peeling of the coating film was observed at each friction frequency. (Fig.1)

TH321 without abrasion | TH321with abrasion of 500 rubs | TH321with abrasion of 1,000 rubs

Fig1. Change in appearance due to number of rubs

[E762-1_durability]

No change in discoloration by the test paper was observed before and after the durability test. (Fig. 2)

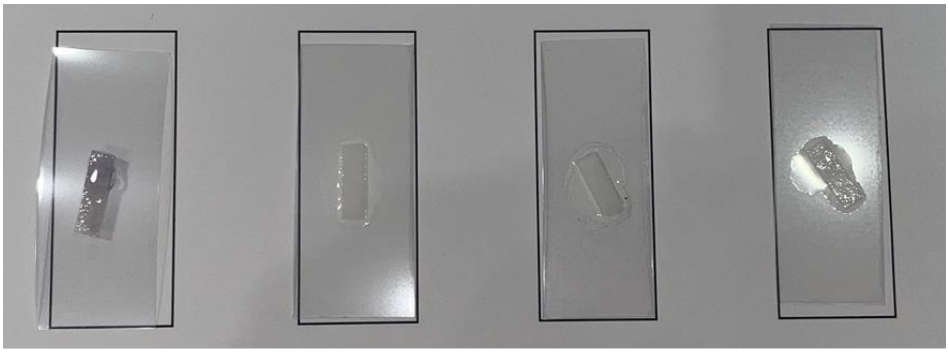

Fig2. Checking discoloration by test paper

Antiviral activity was not significantly changed when OC43 was used for antiviral testing. (Table1.)

Table1. Antiviral test results using OC43

Sample	Contact time	Viral titer (log PFU/㎠)	Antiviral activity	%Reduction
Initial viral titer	0 min	4.36	-	-
Uncoated control	15 min	4.28	-	-
TH321 without abrasion		2.32	2.04	99.09
TH321 with abrasion of 500 rubs		2.02	2.34	99.54
TH321 with abrasion of1000 rubs		2.42	1.94	98.85

9. Summary

Even after 1,000 rubs with a load of 500g, there was no abrasion of the coating layer or decrease in the active ingredients, and the antiviral function was not significantly affected.

These results indicate that the effect of abrasion on the coating layer is negligible.