

# 2021 Revolution for Covid-19 killer Technology

AIPO Technology Co., Ltd. on be half of Curie Limited

**Ariel Huang** 



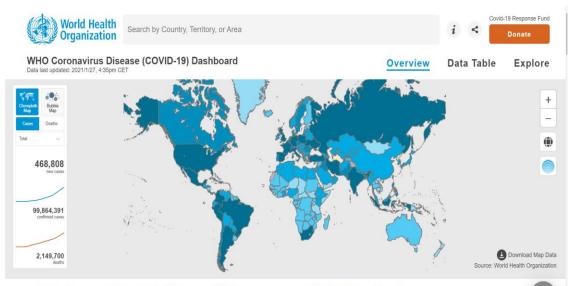
# alpo Agenda

- Current bottleneck for fighting with Covid-19
- Face mask Working Principle and weakness
- New Technology Methodology (ARPMC)
- Performance of ARPMC way (Test Result)
- Certificates
- Strength of New Technology
- Comparison Table
- AIPO Company Introduction
- Certificate of Authority





## Current Bottleneck of fighting with Covid-19



- Globally, as of 4:35pm CET, 27 January 2021, there have been 99,864,391 confirmed cases of COVID-19, including 2,149,700 deaths, reported to WHO.
- Situation by WHO Region Americas 44,197,482 Europe 33.472.928 South-East Asia 12.734.811 Eastern Mediterranean 5.576.021 WALTER STREET, Africa 2,506,862 Western Pacific 1,375,542 Source: World Health Organization Mar 31 Sep 30 Dec 31 Data may be incomplete for the current day or week

- ■No efficient solution to suppress the transmissibility of Covid-19
- ■The second wave of epidemics due to virus mutation
- Even medical staff with complete body protection cannot avoid infection

We need to review the methodology of PPE (especially face mask)!!!

We will propose the revolution of the face mask material technology today.



## **Current Bottleneck of fighting with Covid-19** Problem 1: Current highest grade of masks & PPE can not efficiently protect the healthcare workers.

thebmi

covid-19 Research > Education > News & Views > Campaigns > lobs >

#### News

Covid-19: North Dakota and Belgium have let infected health staff work on wards

BMJ 2020; 371 doi: https://doi.org/10.1136/bmj.m4455 (Published 16 November 2020) Cite this as: BMI 2020;371:m4455

Philippe Devos, head of Belgium's association of medical unions, said in an interview with Deutsche Welle that 10% of doctors and nurses at his hospital, CHC Montlegia, were at home sick because of covid-19, while in other hospitals in the country the absence rate was 25%.4 "We don't have any solution any more," he said. "We are forced to ask them to work, if they agree."

#### PAHO ( Pan Arrenican ( Pan Morid Health House)

COVID-19 has infected some 570,000 health workers and killed 2,500 in the Americas, PAHO Director says

Despite downward trends, human cost of pandemic remains unacceptably high, with almost 4,000 deaths a day in region

Washington D.C., September 2, 2020 (PAHO) - Health workers are especially vulnerable to COVID-19, and in the Region of the Americas.

"We have the highest number of health care workers infected in the world," PAHO Director Carissa F. Etienne said during a press conference today, "Our data shows that nearly 570,000 health workers across our region have fallen ill and more than 2.500 have succumbed to the virus."

Proof 1

Belgium got over 25% of healthcare workers infected, they are geared with highest grade of masks and PPE

■ Proof2

US got over 570,000 healthcare workers infected, they are geared with highest grade of masks and PPF

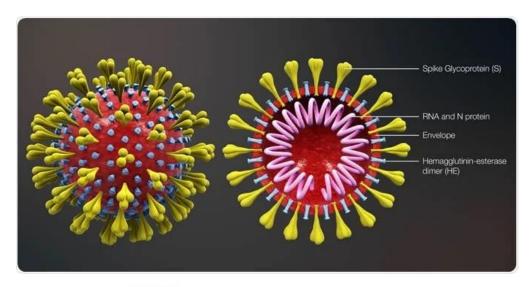
Problem:

**Current highest grade of** masks & PPE can not efficiently protect the healthcare workers.





### **Current Bottleneck of fighting with Covid-19 Problem 2:** The second wave of epidemics due to virus mutation. More spike proteins made 10 times more infectious.



- Spike protein over coronavirus is negative charged.
- Mutation of COVID-19 tend to have more spike proteins.

**Our solution of Covid-19** killing is to use negative charged spike protein characteristics cleverly.

Virology 442 (2013) 74-81



Contents lists available at SciVerse ScienceDirect

Virology

journal homepage: www.elsevier.com/locate/vviro



The Washington Post

Negatively charged residues in the endodomain are critical for specific assembly of spike protein into murine coronavirus



Qianqian Yao a, Paul S. Masters b, Rong Ye as

nent of Microbiology and Parasitology, School of Basic Medical Sciences, Fudan University, Shanghai 200032, China

#### ARTICLE INFO

Article history: Received 20 February 2013 Returned to author for revisions 1 April 2013 Accepted 1 April 2013 Available online 28 April 2013

pike glycoproteir

legatively charged residues

#### ABSTRACT

Coronavirus spike (S) protein assembles into virions via its carboxy-terminus, which is composed of a transmembrane domain and an endodomain. Here, the carboxy-terminal charge-rich motif in th endodomain was verified to be critical for the specificity of S assembly into mouse hepatitis virus (MHV). Recombinant MHVs exhibited a range of abilities to accommodate the homologous S endodomains from the betacoronaviruses bovine coronavirus and human SARS-associated coronavirus, the alphacoronavirus porcine transmissible gastroenteritis virus (TGEV), and the gammacoronavirus avian infectious bronchitis virus respectively. Interestingly, in TGEV endodomain chimeras the reverting mutations resulted in stronger's incorporation into virions, and a neg gain of negatively charged residues in the charge-rich motif accounted for the improvement. Additionally, MHV S assembly could also be rescued by the acidic carboxy-terminal domain of the nucleocapsid protein. These results indicate an important role for negatively charged endodomain residues in the incorporation of MHV S protein into assembled virions

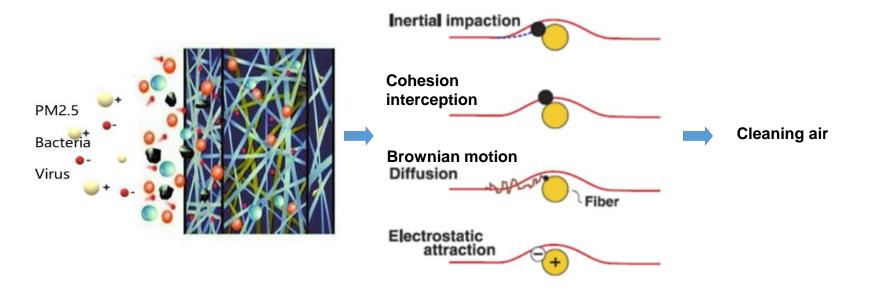
This coronavirus mutation has taken over the world. Scientists are trying to understand why.

Studying both versions of the gene using a proxy virus in a petri dish of human cells, Choe and her colleagues found that viruses with the G variant had more spike proteins. and the outer parts of those proteins were less likely to break off. This made the virus approximately 10 times more infectious in the lab experiment.



## Working Principle of Traditional fiber filter

#### **Filtration Mechanisms**



#### Adsorption of dust/Bacteria/Virus is by polarized charged fibers

Mainstream material for air filtration is meltblown. Meltblown rely on physical electrostatic force to arrest COVID-19, but not relying on the fabric density. When particles are passing through meltblown fabric, they shall be induced by electrostatic force, and then attached to fabric surface





## Working Principle of Traditional fiber filter

Category	MEDICAL MASKS		FACIAL FILTERING RESPIRATORS		
MEDICAL MASKS Measures % efficacy of bacterial filtration efficiency (BFE) of the particle size @3.0 microns  Bacteria and viruses  Droplets Solashes	USA: ASTM F2100	Filtration efficiency is one of five tests conducted to classify the masks under 3 levels	<b>Level 1</b> ≥ 95%	<b>Level 2</b> ≥ 98%	<b>Level 3</b> ≥ 98%
	EU: EN 14683	Filtration efficiency is one of four tests conducted to classify the masks under 3 types	<b>Type I</b> ≥ 95%	<b>Type II</b> ≥ 98%	TYPE IIR ≥ 98%
FACIAL FILTERING RESPIRATORS Measures the % efficacy of the penetrating particle size @0.3 microns  Bacteria and viruses  Droplets  Splashes	USA: 42 CFR 84	This standard meets the performance criteria set by CDC for respiratory devices used in healthcare settings and is used by US National Institute for Occupational Safety and Health (NIOSH) for certification	<b>N95</b> ≥ 95%	<b>N99</b> ≥ 99%	<b>N100</b> ≥ 99.97%
	EU: EN 149	This standard specifies minimum requirements for filtering half masks as respiratory protective devices to protect against particles except for escape purposes	<b>FFP 1</b> ≥ 80%	<b>FFP 2</b> ≥ 94%	<b>FFP 3</b> ≥ 99%

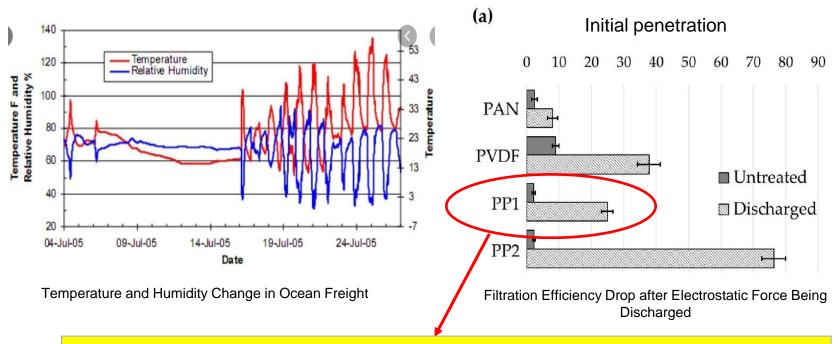
#### REMEMBER:

- Always ensure compliance with your local public health authorities regulations surrounding usage and selection guidance of personal protective equipment (PPE) to combat the COVID-19 pandemic.
- Testing method of ASTM and EN mainly focus on **Particulate Filtration Efficiency (PFE).**
- Physical properties of particulate vary to COVID-19.
  Particulate is neutral charged, they can be induced and arrested under electrostatic force.
- **COVID-19** is **strong negative charged**, negative charged electrostatic force will repel instead of arresting COVID-19





## **Weakness of Traditional fiber filter**



PP1 is a polypropylene homopolymer, which is purified and more expensive material for meltblown. The World Health Organization (WHO) conducted a study and found that major material of meltblown for 3M masks only achieved 75% protection efficiency.

Electrostatic force would be discharged during transportation or wearing because of hot weather and high humidity.





## **Weakness of Traditional fiber filter**

Clinical Infectious Diseases

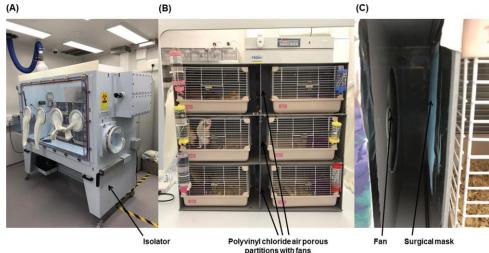
MAJOR ARTICLE





Surgical Mask Partition Reduces the Risk of Noncontact Transmission in a Golden Syrian Hamster Model for Coronavirus Disease 2019 (COVID-19)

Jasper Fuk-Woo Chan, <sup>12,26</sup> Shuofeng Yuan, <sup>1-6</sup> Anna Jinxia Zhang, <sup>1-6</sup> Vincent Kwok-Man Poon, <sup>1</sup> Chris Chung-Sing Chan, <sup>1</sup> Andrew Chak-Yiu Lee, <sup>1</sup> Zhimeng Fan, <sup>1</sup> Can Li, <sup>1</sup> Ronplei Liang, <sup>1</sup> Jiani Cao, <sup>1</sup> Kaimin Jang, <sup>1</sup> Cutting Lue, <sup>1</sup> Vincent Chi-Chung Cheng, <sup>1</sup> Jian-Piao Cai, <sup>1</sup> Hin Chu, <sup>1</sup> Kwok-Heng Chan, <sup>1</sup> Kevik-Kai-Wang, <sup>1</sup> Siddahri Schlan, <sup>2</sup> Jian Chung, <sup>2</sup> Lee Chan, <sup>1</sup> Kevik-Hong Chan, <sup>1</sup> Kevik





The University of Hong Kong found masks would only have 66.6% / 83.3% protection efficiency against latest mutation of COVID-19.

Green line: Surgical mask Red lines: Air flow



## **Bottleneck of current mask standards**

- ASTM F2100 / NIOSH / EN14683 / EN149 only focus on Particulate Filtration Efficiency (PFE)
- PFE is using neutral charged NaCl to test penetration rate of masks, but the Physical properties and motions are fundamentally different from COVID-19.
- Electrostatic force will work well on neutral charged object, but they would be less effective on negative charged COVID.
- Mutation of COVID make it much stronger in negative charged than the 1<sup>st</sup> generation.
- Current standard can not test:
- 1. **Electrostatic lost in transportation**: Transportation & storage will reduce filtration efficiency
- 2. **Head motion** will shake COVID-19 inwards to our mouth during wearing







## Revolution of mask material design ~ARPMC patented way

(Aldrin & Rayman's Strong Polycationic Mechanism and Composite)

### **Technical Path**

1. Strong positive charged polymer attract negative charged protein based biohazard like COVID-19

2. Polymer arrest biohazard like COVID-19

3. Polymer tear off envelope of biohazard like COVID-19



**Exposed RNA** 

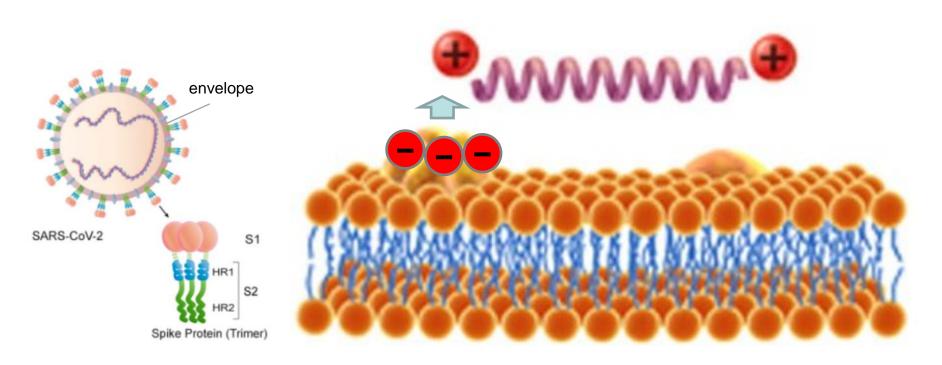
Dead COVID-19

**Fabric Surface with Strong Positive Charged Polymer** 

New approach is using strong positive charged polymer to build up a nano net between fabric base to arrest COVID-19



## **Methodology of ARPMC method**



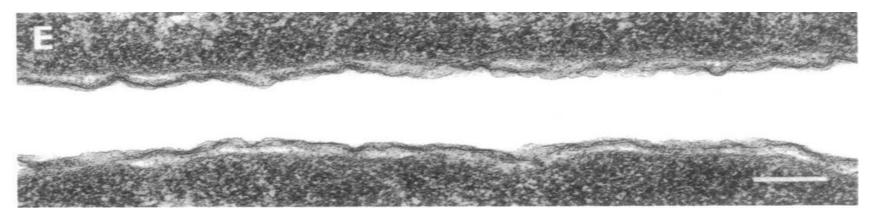
Strong positive charged polymer will attract negative charged polar head in the envelope of COVID-19, then tear it off and kill it.



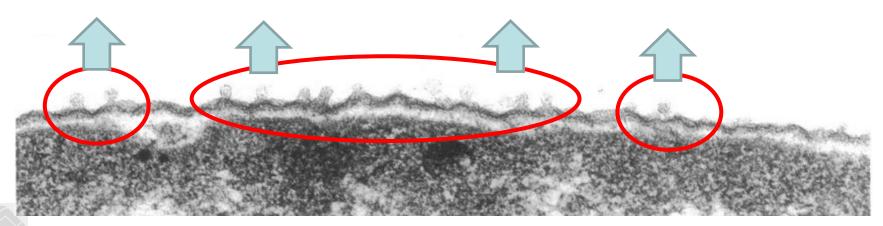


## **Methodology of ARPMC method**

#### Normal bacterial envelope

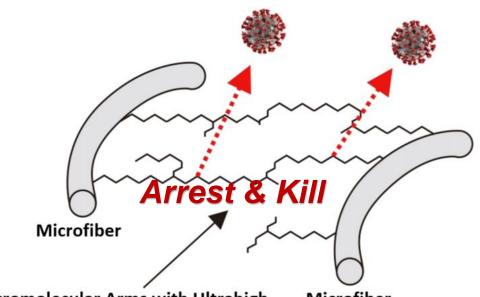


When the bacterial envelope is sensed to the positive, the head with the negative phosphate is pulled up





### **ARPMC** method



- Cost efficient
- Scalable rapid production
- stable (NO effected by hot weather & high humidity)
- No Sequelae (NO toxicity and heavy metals inside)

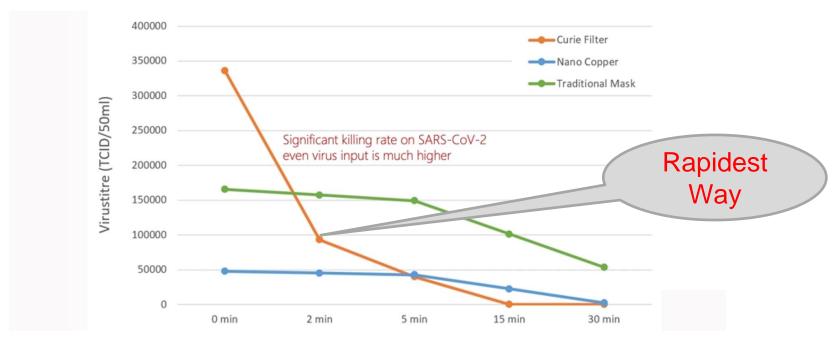
Macromolecular Arms with Ultrahigh Virus- and Bacteria-Affinity Components Microfiber

New approach is using strong positive charged polymer to build up a nano net between fabric base to arrest COVID-19





## Performance of ARPMC methodCOVID Killing Test Report



Note: Internal experimental data from the University of Hong Kong have not yet been made public Date: Jan. 2021

Only 2 minutes can reduce almost 77% Virustitre
Only 15 minutes can reduce almost 100% Virustitre





## Performance of ARPMC method ~ COVID Killing Test Report



Study Number 1280865-S01 Viral Filtration Efficiency (VFE) Final Report

#### Results:

Test Article Number	Percent VFE (%)	
1	>99.9ª	
2	>99.9ª	
3	>99.9ª	
4	>99.9ª	
5	>99.9ª	

<sup>&</sup>lt;sup>a</sup> There were no detected plaques on any of the Andersen sampler plates for this test article.

The filtration efficiency percentages were calculated using the following equation:

$$\% VFE = \frac{C-T}{C} \times 100$$

C = Positive control average

T = Plate count total recovered downstream of the test article Note: The plate count total is available upon request Report No: ATCCR20081010F

#### Test results

Virus Types	(NO)	$lg(Va_{0h})$ ( $lgTCID_{50}/mL$ )	$lg(Vb_{2h})$ ( $lgTCID_{50}/mL$ )	lg(Vc <sub>2h</sub> ) (lgTCID <sub>50</sub> /mL)	
COVID-19 virus MDCK cells	1	6.73	6.68	3.7	
	2	6.68	6.56	4	
	3	6.7	6.57	3.9	
Average Value of lgTCID50/mL		6.70	6.61	3.88	
Antiviral Activity Value		2.72			
Antiviral Activity Rate (%)		99.81			

New approach can arrest **99.9a%** of virus

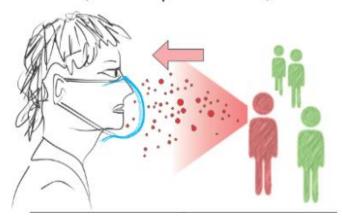
New approach can kill **99.81%** of COVID-19



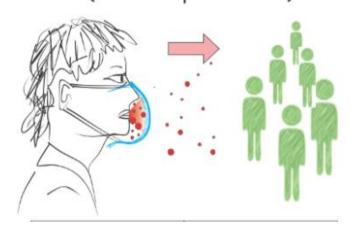


## **Function of ARPMC method**

## protecting yourself (inward protection)



## protecting others (outward protection)



For Healthy people
Arrest & Kill COVID-19 outside the mask
can protect ourselves

Arrest 99.9a%/ kill 99.81% of COVID-19

For infected people
Arrest & Kill COVID-19 inside the mask
can protect others

Arrest 99.9a%/ kill 99.81% of COVID-19





### Full certificates of ARPMC method

#### Qualifications and Certifications



US Patent Number 62988900



HK Patent Number 32020008506.8



US FDA Establishment Registration and Device Listing
US FDA Personal Protective Equipment Emergency Use Authorization (PPE EUA)



EU CE Disposable Medical Face Mask Class I / Type IIR

EU CE EN149:2001+A1:2009 - FFP2 EU CE EN149:2001+A1:2009 - FFP3



Taiwan Ministry of Health and Welfare Medical Device Manufacturing No. 008382



ISO9001:2015 ISO 14001:2015 EN ISO 13485:2016



Viral Filtration Efficiency (VFE) in ASTM F2101

Proven that Curie technology can effectively filter virus (>99.9a%)



Bacterial Filtration Efficiency with Increased Delivery Challenge (BFE) in ASTM F2101 and EN14683

Proven that Curie technology can effectively filter increased challenge of bacteria



Viral Filtration Efficiency (VFE) in ASTM F2101

Proven that Curie technology can effectively filter virus (>99.9a%)

US Patent WIPC2002 HK Patent

ASTM F2101 VFE ASTM F2101 BFE ASTM F1980

ASTM F2100 Level 3

ISO18184 COVID-19 ISO18184 H3N2 ISO20743

EN ISO 21084:2019 EN ISO 18254:2016 EN ISO 14184:2011 EN ISO 14389: 2014

JIS L 1041

DIN EN ISO 17070:2015

64 LFBG B 82.02-08

US CPSC-CH-C1001-09.4

Derka SARS-CoV-2

**EN149 FFP2** 

EN14683 Type IIR

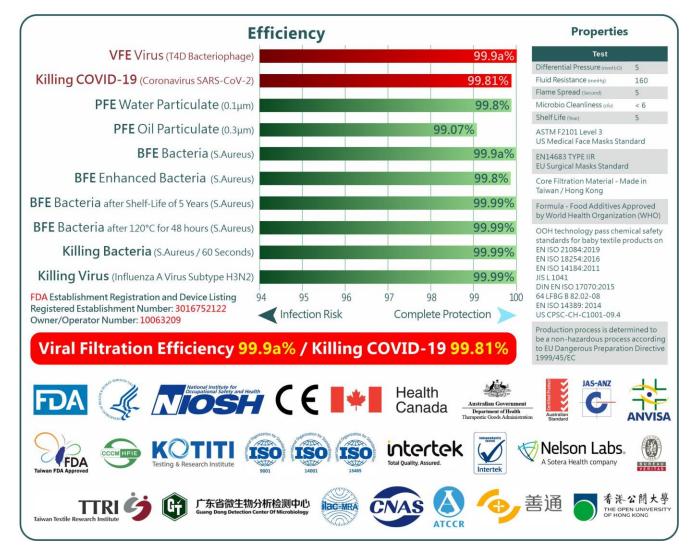
GB19083

GB2626





## **Full certificates of ARPMC method**







## **Function of ARPMC mask**

### **Primary Infection**



Breathing: < 1,000 COVID-19 viruses

Coughing: < 1,000,000 COVID-19 viruses

Infection : Breathing in > 100 active COVID-19 viruses

Type of Mask	No of Virus Penetrating Mask		
	Breathing	Coughing	
VFE 95%	<50	<50,000	
VFE 99%	<10	<10,000	
Curie	<1	<10	

## **Secondary Infection**

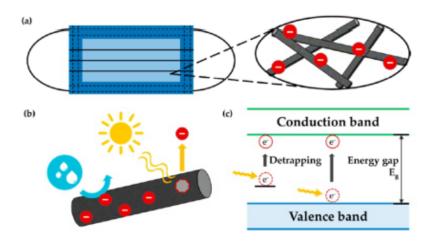


- Viruses can survive on the surface of traditional masks for 7 days
- Viruses can grow 180 times more after 4 hours of usage
- We get infected by touching masks when they are full of viruses
- We bring masks with viruses back home, and cause secondary infection in our home environment
- A COVID-19 killing mask can fully protect against secondary infection



## **Comparison**

### **Shortcoming of Traditional Mask**



Meltblown cloth relies on electrostatic to capture bacteria and viruses. Surface proteins of bacteria and viruses are negative-charged, and the electrostatic itself is negative. The polarity of the two is the same and therefore it repels – inefficient in capturing microbials.

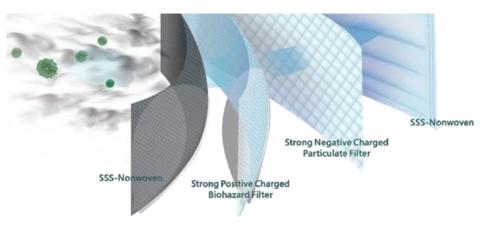
Electrostatic itself is unstable, and it is easy to dissipate and discharge due to high temperature and humidity. Few hours after the mask used, the filtration efficiency begins to decay.

## **ARPMC** way Mask

The first Face Masks proven to kill COVID-19 (99.81%) Ultrahigh Efficiency Combined with Viral Filtration Efficiency VFE (>99.9a%) Over 500 times more effective than traditional masks, with High-Fold Improvement 5 years shelf life for filtration and killing Unlike other killing masks using toxic metallic composites, our **Food Grade** Safety formula - Food grade additives approved by WHO Well Endorsed by **Intertek Tick Mark** on ultrahigh safety, quality Recognized and peroformance Enduring extreme environment (120°C for 48 hours), unlike True-Safe meltblown masks losing efficiency during transportation Protection Affordable and competitive cost with scalable production Affordable capacity (70M masks per day) Cost



## **Product Introduction**



## KV99 Flat Mask (3M Nexcare Alternative)



Article No : KV99-1
Product Name : Curie Dis

Product Name : Curie Disposable Surgical Face Mask
Standard Applied : EN14683 Type IIR / ASTM Level 3 / YY0469-2011

Specification : Flat, Ear-Loop Mask, 17.5cmX9.5cm
Material : 34% Positive Charged Biohazard Filter

: 34% Positive Charged Biohazard Filter 22% Meltblown Non-Woven /

44% Non-Woven Fabric

#### Main Performance:

1) Particulate Filtration Efficiency (PFE) : > 99% 2) Bacterial Filtration Efficiency (BFE) : > 99.99% 3) Viral Filtration Efficiency (VFE) : > 99.9a% 4) Bacterial Killing Rate : > 99.99% 5) H3N2 Killing Rate : > 99.99% 6) COVID-19 Killing Rate : 99.81% 7) Differential Pressure : < 5mmH20 8) Splash Resistance Pressure : < 160mmHa 9) Microbial Cleanliness : < 30cfu/g 10) Flame Spread : < 5 Seconds 11) Shelf Life : 5 Years

 Packing Details
 : 1 Carton X 40 Boxes X 50 Pieces

 Carton Size
 : 570mm X 390mm X 420mm

Gross Weight : 9.2kg

#### KV99 3D Mask

(3M 1870 Alternative)



Article No : KV99-2

Product Name : Curie Disposable Foldable Respirator
Standard Applied : EN149 FFP2 / EN14683 Type IIR / ASTM Level 3

Specification : Foldable, 10.7cm X 16cm

Material : 34% Positive Charged Biohazard Filter

22% Meltblown Non-Woven /

22% Meltblown Non-Wove

44% Non-Woven Fabric

#### Main Performance:

1) Particulate Filtration Efficiency (PFE) : > 99% 2) Bacterial Filtration Efficiency (BFE) : > 99.99% 3) Viral Filtration Efficiency (VFE) : > 99.9a% 4) Bacterial Killing Rate : > 99.99% 5) H3N2 Killing Rate : > 99.99% 6) COVID-19 Killing Rate : 99.81% 7) Differential Pressure : < 5mmH20 8) Splash Resistance Pressure : < 160mmHg 9) Microbial Cleanliness : < 30cfu/g

 10) Flame Spread
 : < 5 Seconds</td>

 11) Shelf Life
 : 5 Years

 Packing Details
 : 1 Carton X 20 Boxes X 30 Pieces

 Carton Size
 : 645mm X 310mm X 300mm

Gross Weight : 4.9kg

#### **KV99 NIOSH Mask**

(3M 1860 Alternative)



Article No : KV99-3
Product Name : Curie Disposable Cup Shaped Respirator
Standard Applied : NIOSH N95 / EN149 FFP2
Specification : Cup Shaped, 10.7cm X 16cm
Material : 34% Positive Charged Biohazard Filter

22% Meltblown Non-Woven / 44% Non-Woven Fabric

44% Non-Woven Fabric

#### Main Performance:

1) Particulate Filtration Efficiency (PFE) : > 99% 2) Bacterial Filtration Efficiency (BFE) : > 99.99% 3) Viral Filtration Efficiency (VFE) : > 99.9a% 4) Bacterial Killing Rate : > 99.99% 5) H3N2 Killing Rate : > 99.99% 6) COVID-19 Killing Rate : 99.81% 7) Differential Pressure : < 5mmH20 8) Splash Resistance Pressure : < 160mmHg 9) Microbial Cleanliness : < 30cfu/a

10) Flame Spread : < 5 Seconds
11) Shelf Life : 5 Years

Packing Details :1 Carton X 20 Boxes X 20 Pieces
Carton Size :670mm X 435mm X 320mm

Gross Weight : 6.5kg





## **Application**

- Reusable / Washable with COVID Killing Function
  - Kill 99.28% COVID-19 after 60 Mechanical Washes
  - Already deployed on Medical Uniform
  - More deployments in 2021
    - Corporate Uniform
    - School Uniform
    - Hotel Bedding
    - Reusable Mask
    - Washable PPE Coverall





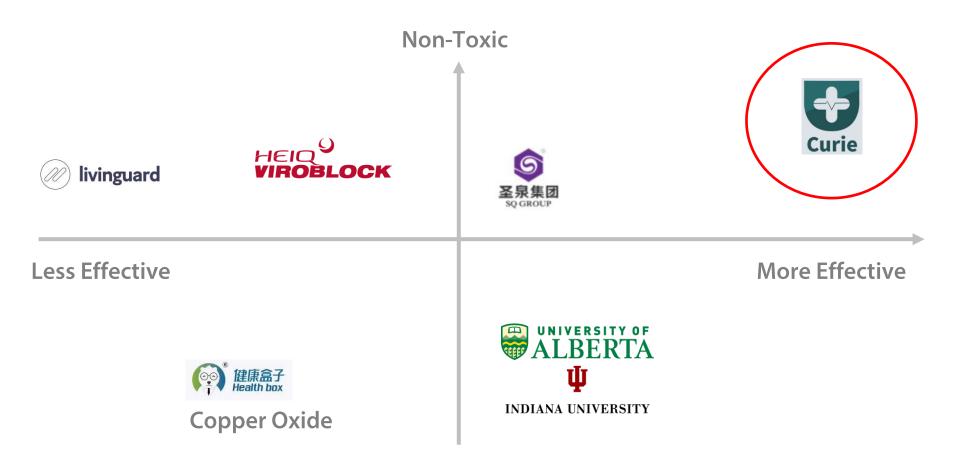






**Frust Together** 

## **Competition Map**



**Toxic** 



## **Team Introduction**

#### **■ Technology Owner**

- 1. Inventor: Jianliang GONG, Yau Ma Tei and Chun Yin OR, Cheung Sha Wan
- 2. Aldrin and Rayman invented a composite to enhance the affinity between scaffolding and human cells, therefore human cells can grow along the designated shape as a functional human tissue.

### Authorized Agent/Distributor

- 1. Italian government vendor code: FOR-002157
- 2. already worked for several government PPE procurement, include Italian, California government, Egypt..
- 3. www.aitecpro.com









Curie

killer Volunteers Team

**AIPO** 

Group

Likangyuan Medical Device

### Authorized Factory



The State Drug Administration and the China Medical Insurance Chamber of Commerce medical materials production enterprises double-white list enterprises





## **Factory Overview**























## **Factory Overview (in house LAB)**













## **Factory Overview (in house LAB)**



Mask pull test equipment



Mask filtration efficiency test equipment



Ethylene oxide residue testing equipment

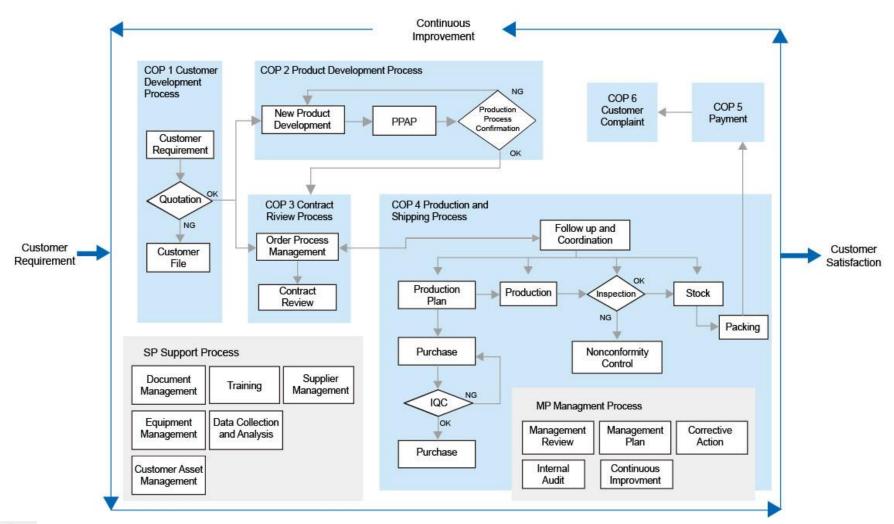


Mask breathing resistance test device





## **Quality management system**







## Bring human health and happiness back to their own Oasis.





掃描上面的 QR Code, 加我 WeChat。

