

Curie Limited - Hong Kong

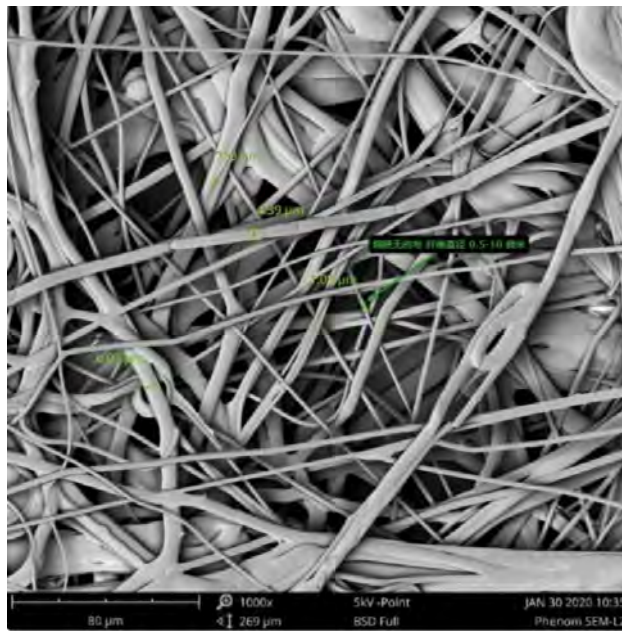
Curie Highlight

- We secured a patent on "Air filtration system and manufacturing method having antiviral and antibacterial effectiveness by strong polycationic mechanism and composite" in the US and HK, patent covers 153 countries.
- We are the first one in the world who successfully commercialized this composite with an extremely competitive production cost, and we are applying this mechanism on mask production.
- Our composite achieved an ultra-high Viral Filtration Efficiency (VFE / > 99.9a%) and Bacterial Filtration Efficiency (BFE / > 99.9a%) according to ASTM F2101 and EN14683 testing method.
- Our composite achieved an ultra-high killing rate on COVID-19 (99.81%), H3N2 (99.99%) and Staphylococcus Aureus (99.99%).
- Our composite achieved an ultra-killing time on microorganism (< 60 seconds).
- Our composite achieved an ultra-high Bacterial Filtration Efficiency (BFE / >99.9a%) after conditioning composite according to ASTM F1980-16 Ageing Process to simulate 5 years storage, which overachieve the requirements of western governments as strategic inventory on masks. Such requirements are the benchmark of western governments, they are all anticipating a material that can stay in high filtration efficiency on biohazards after lengthy storage.
- Our composite achieved a high Bacterial Filtration Efficiency (BFE / >95%) on a reusable mask, after washing 80 times with cold water and washing powders. It is the first mask in the world that stays in EN14683 medical grade after 80 times of washing.
- Our composite achieved an ultra-high killing rate on COVID-19 (99.28%) after washing 60 times with cold water and washing powders in washing machine.
- Our composite does not involve with any toxicity and heavy metals. Our major ingredient is a food additive approved by World Health Organization (WHO).
- Our composite complies with safety standards for textile standard for infants.
- Our composite achieved "Arrest" and "Kill" simultaneously with competitive production cost and durable performance in a safe chemical composite.
- We design and manufacture KV99 masks, which can achieve an almost perfect balance on production cost, filtration efficiencies on particulate / bacteria / virus, air permeability, anti-viral, anti-bacterial and durability than existing mask design.
- Intertek granted Intertek Tick Mark on KV99 masks to endorse the quality, safety, performance, and functions of KV99 masks.
- Our composite works more effectively on the latest mutated COVID-19, which has much more protein spikes, which means it is almost 10 times more negative in electric charge.
- We launch the production of our composite in Hong Kong, and daily production capacity is 20 tons, which is scalable compared to meltblown production, which can only produce 1 ton per day for a 3 millions machine.

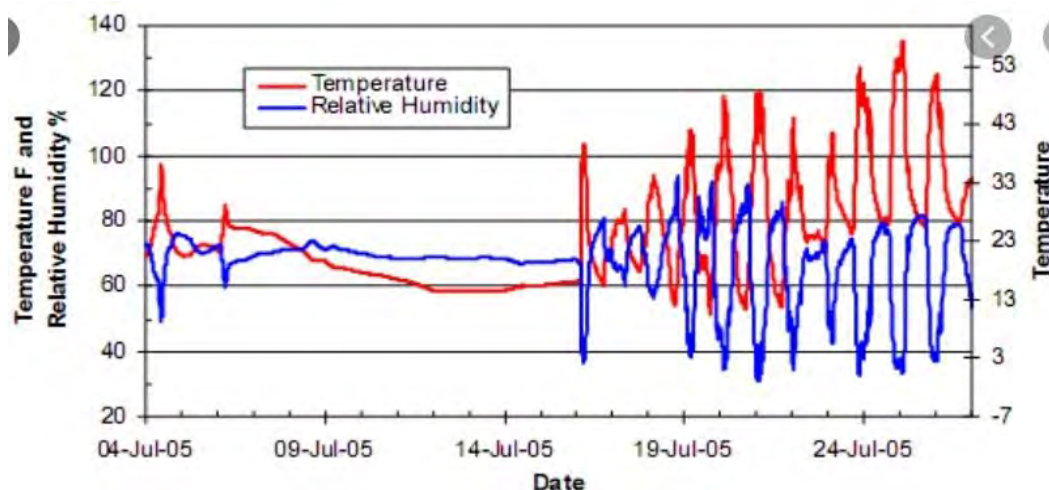
Curie Inception

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.

Electrostatic force is suffered from a fundamental shortcoming, it will be discharged by hot weather and high humidity, as a result, filtration efficiency will drop significantly.



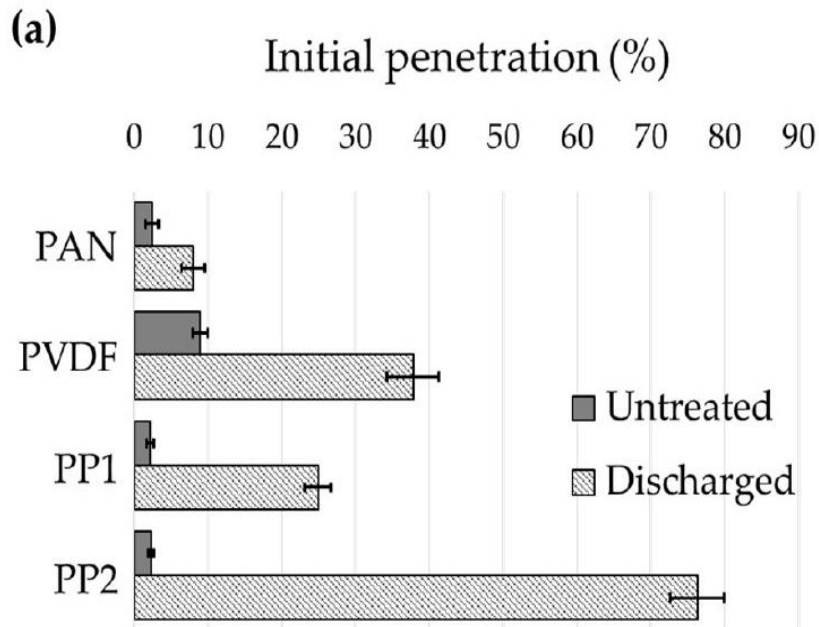
When masks are put into a freight container and shipped via ocean, extreme conditions during transit have severe impacts on the mask efficiency to protect against bacteria and viruses. The temperatures inside the container are cycled anywhere from 58°C to 16°C every day. Humidity levels on the ocean can reach detrimentally high levels. Such environments provide a perfect condition to discharge electrostatic force on masks and their meltblown. Seoul National University conducted an experiment in March 2020, that demonstrated that after the electrostatic force is discharged, the meltblown in masks cannot protect you much from dust, bacteria, and viruses.



Face Mask which Arrest and Kill COVID 19

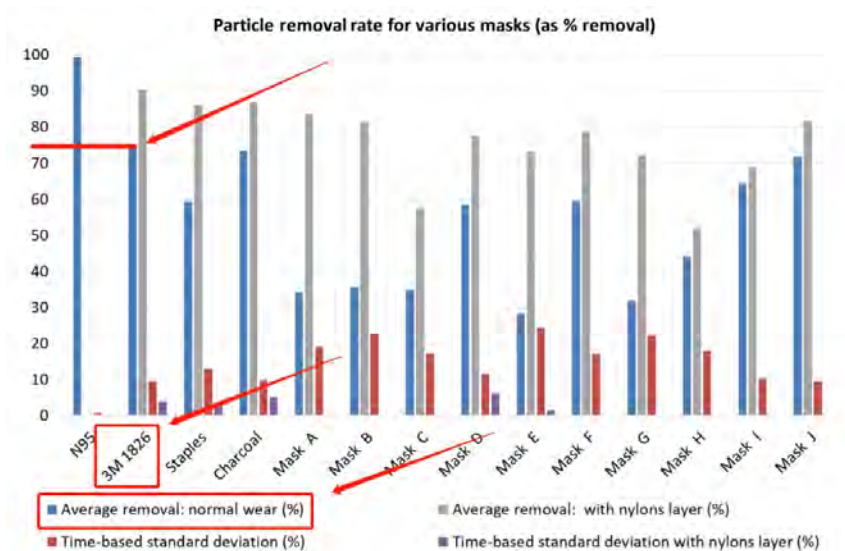


This graph above shows an example of what conditions the masks will face inside the container. The humidity and temperature levels will directly affect the mask integrity of the protection efficiency. Every container takes about 1 month for traveling. By the time the mask reaches the consumer, the electrostatic force has been heavily discharged.



PP1 is a polypropylene homopolymer, which is purified and more expensive material for meltblown. PP2 is a propylene-ethylene copolymer, which is impurified and cheaper material for meltblown. Both are the major ingredients for meltblown. In the graph above, you can see how the electrostatic force is radically discharged. The World Health Organization (WHO) conducted a study and found that major material of meltblown for 3M masks only achieved 75% protection efficiency. As 3M mask uses PP1, the case study matches with the graph data as shown.

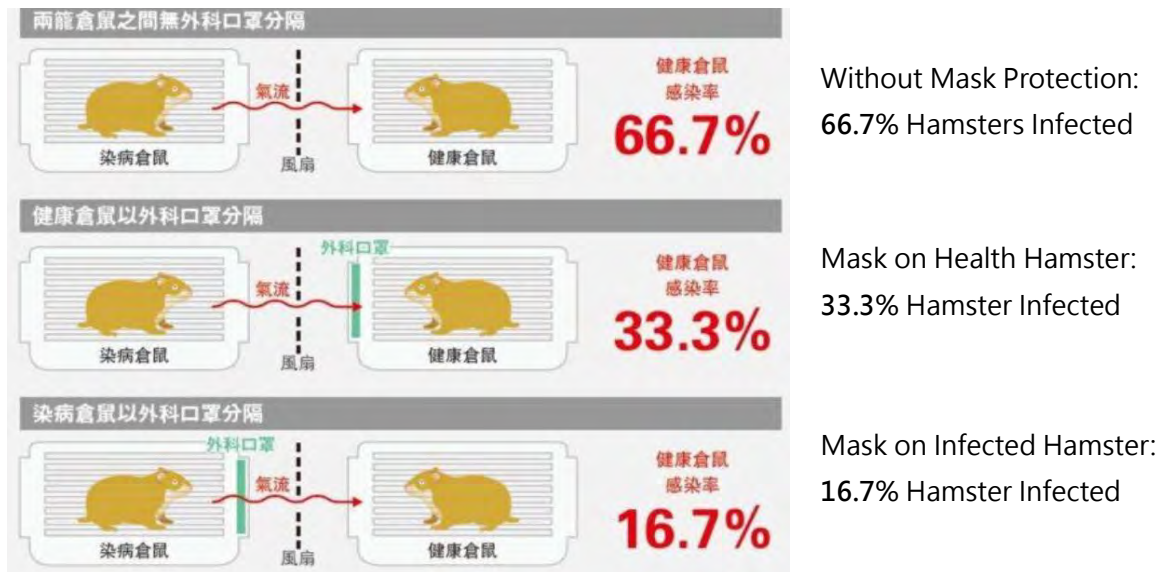
Northeastern University, Boston discovered, even top-grade mask like 3M, their filtration efficiency is just around 75%.



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The University of Hong Kong discovered, meltblown mask will only reduce infection rate of COVID-19 between hamsters to 66.6% / 83.3%, but not claimed 99%.



Now Belgium got almost 1/3 of healthcare workers infected, and United States got over 570,000 healthcare workers infected. Those healthcare workers wear the best PPE in the world, above findings are the possible contributor on high infection rate among healthcare workers in western countries.

Loophole of Current Testing Method

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. While COVID-19 is strong negative charged, negative charged electrostatic force will repel instead of arresting COVID-19.

Repealing is dangerous in air filtration theory, as it may bounce between fabric base, and induce unpredictable physical motion.

Current testing methods do not take account to the effect of head motion during wearing, and electrostatic discharge during transportation and storage.

We need a more accurate testing method to accurately simulate the infection of COVID-19, and we design the true protection gear according to this new standard.

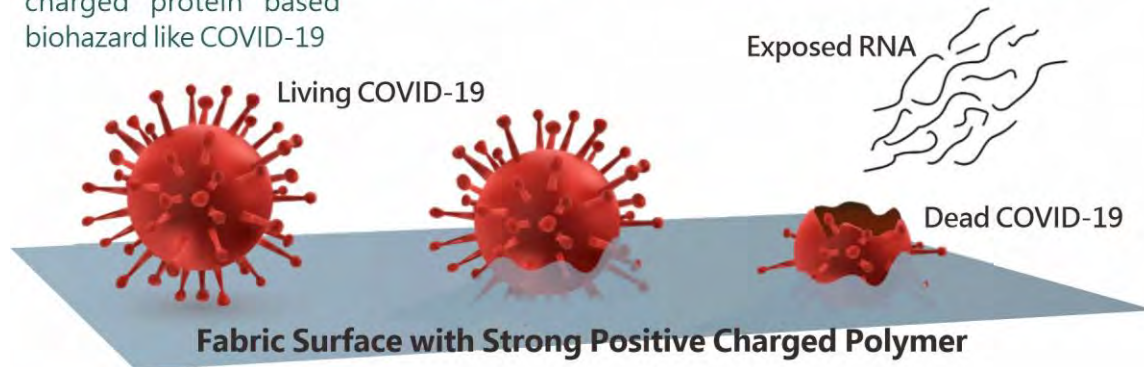
A New Approach

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



To protect the US and Europe, a new approach different from electrostatic force was needed. This new approach needed to be cost efficient and have scalable rapid production. It has to be stable - able to survive extreme conditions without sacrificing its protective efficacy and remain safe for continual human consumption.

In 2013, the New York State Department of Health discovered spike proteins over coronavirus resulting in a strong negative charge. With the strands of COVID-19 in September 2020 already different from COVID-19 on December 2019, the virus now contains 10 times more negatively charged spike protein, and which in fact makes the virus stronger and more difficult to stop. If COVID-19 acted like SARS in 2003, the virus outbreak should have been stopped in June 2020.

So, what is different about COVID-19? As negatively charged, COVID-19 is inarguably much stronger than SARS. With a stronger negative charge, the greater affinity to ACE-2 receptor infection rate is much higher than other coronaviruses, similar to SARS. So how do we kill it? The best way to arrest and kill, would be a strong positive charge. The solution would be to maintain a stable positive charge that can withstand all types of deteriorating conditions brought on with time and transport. The only way to maintain a stable positive charge is by a chemical nano structure and not an unstable electrostatic charge. Our positive charge chemical nano structure can only be destroyed at temperature in excess of 300°C, or exposure to strong acid. We have stress tested our product and put our fabric into 120°C ovens for 48 hours. The result is that our filtration efficiency remains the same at 99.99%. Our BFE and VFE will stay the same even during extreme atmospheric conditions in transport from China to the US or Europe.

This is just the first issue of electrostatic discharge during transport solved by our team. The second issue happens as you wear a mask. Virus and bacteria will begin to grow after 4 hours of usage.

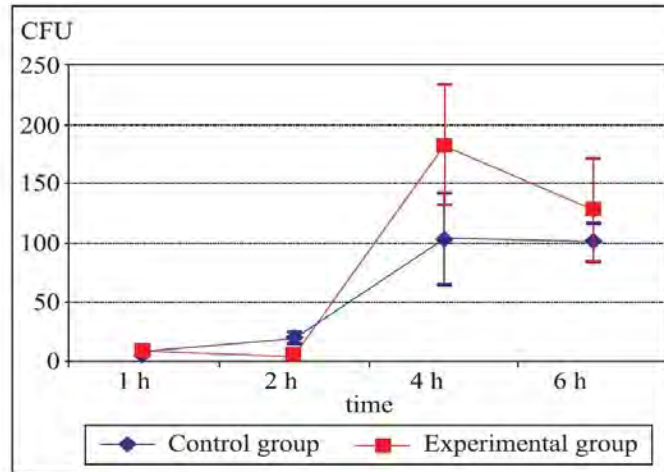
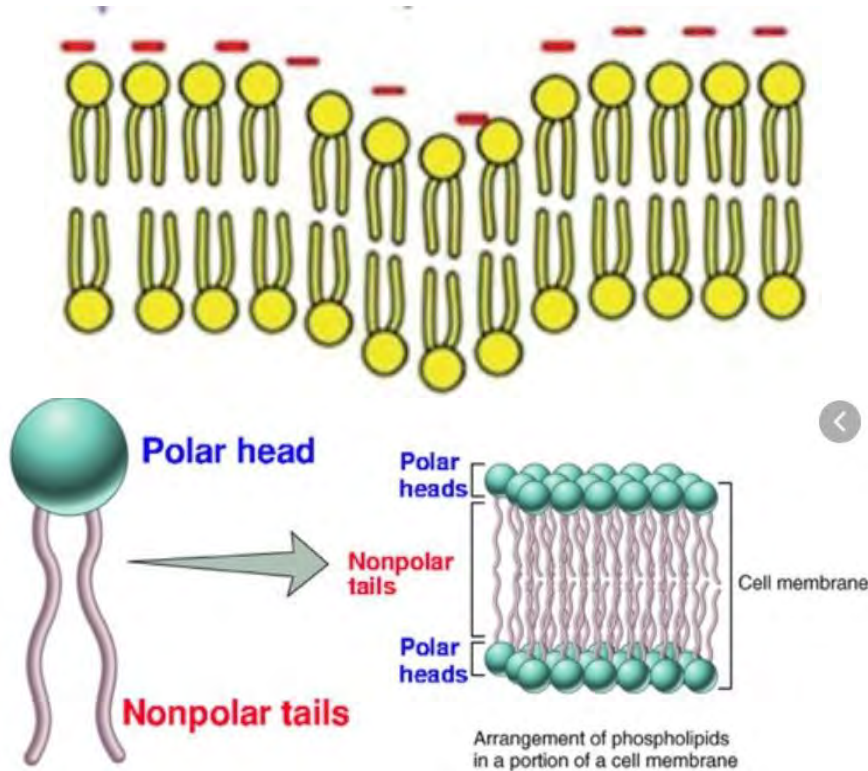


Figure 1. Counts of CFU on operation tables, after 1h,2h, 4h and 6 h of expositon.

The growth rate of bacteria and virus can reach up to 180 times or more. As regular movement of the head occurs, the virus will airborne itself again. And in reality, as people temporarily take off and set down their mask to surfaces (e.g. to eat or drink), probably transference of COVID-19 is high. This is the reason why COVID-19 needs to be killed on mask.



Examined under an electron microscope, you will find that the envelope of COVID-19 is a very fragile protein chain, with a negatively charged polar head. Once they experience a positive charge, it will pull that polar head, and the chain will break. The envelope of the virus will tear off a hole and they will die.

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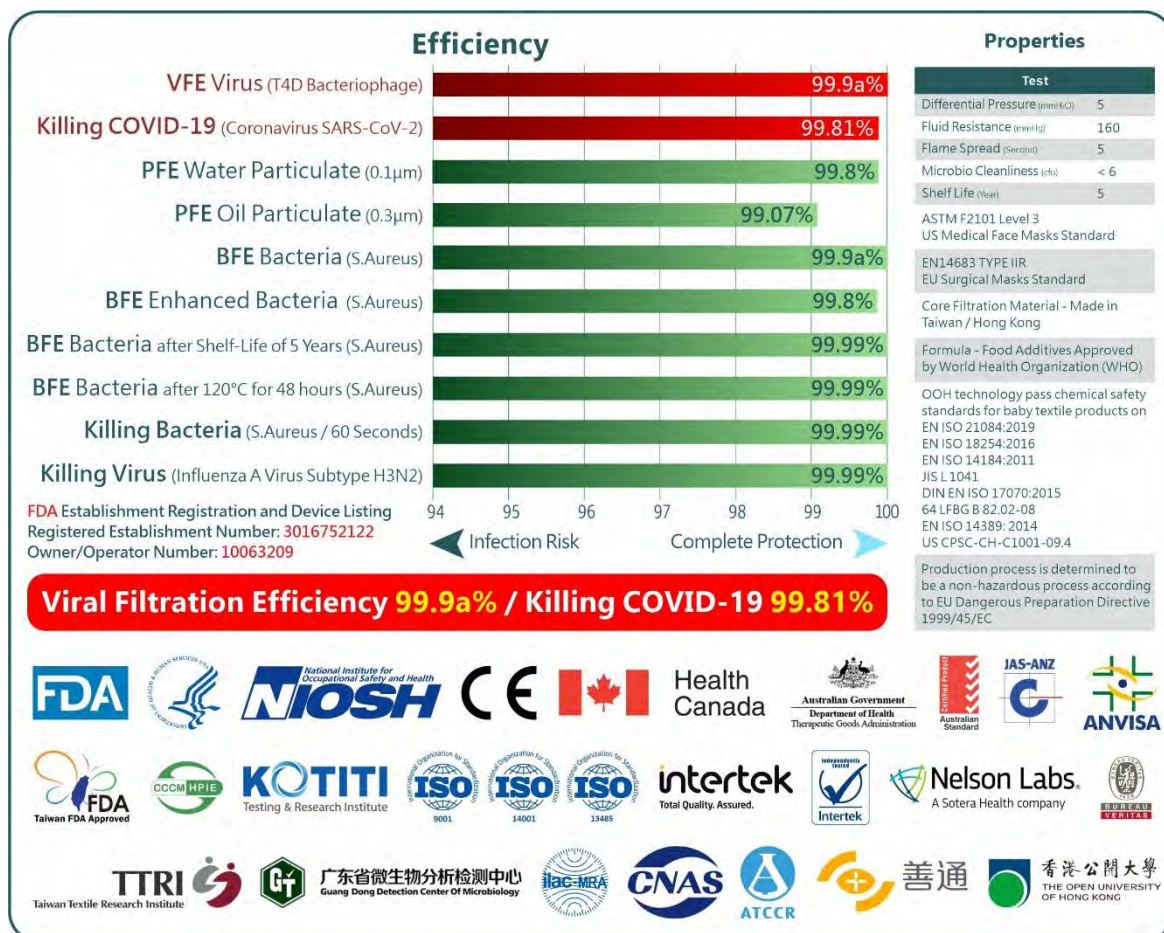
Therefore, a positive charge provides a double benefit here:

1. Arresting
2. Killing

The mutation trend of COVID-19 is having more spike proteins and grows stronger on negative charges. Electrostatic forces work less efficiently under this mutation trend. And our positive charge will work more effectively.

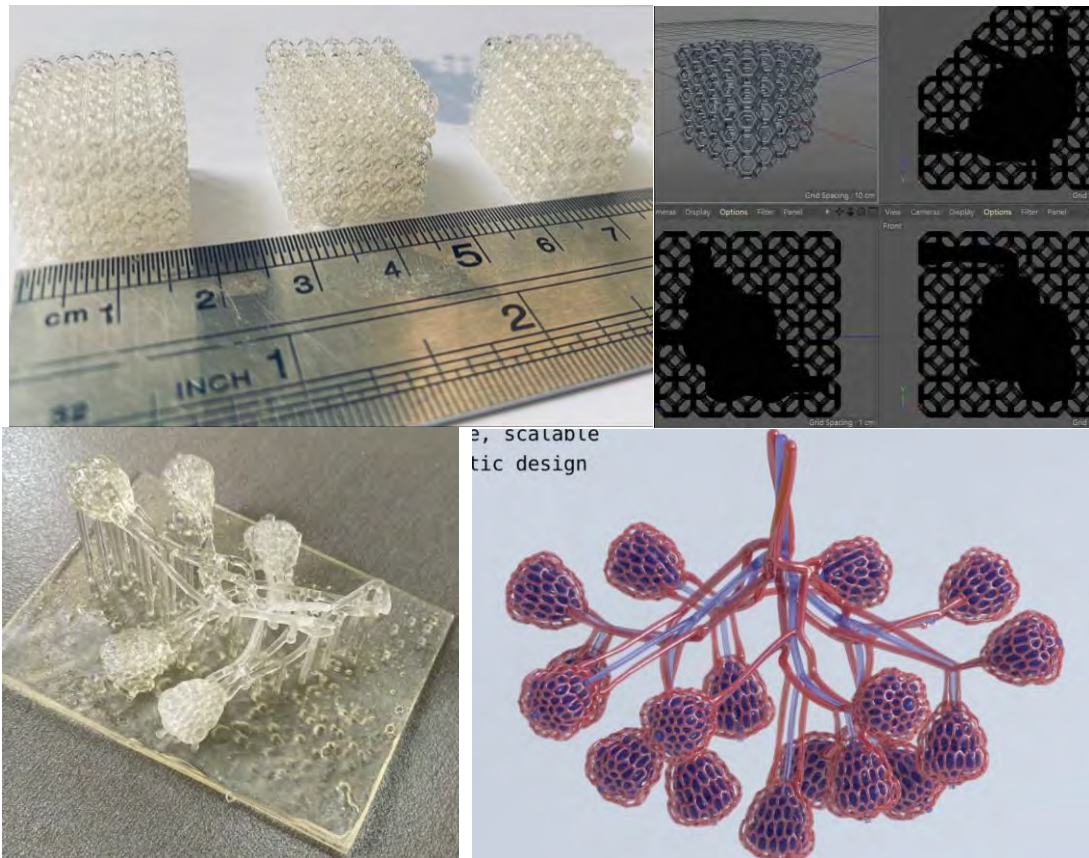
Being able to create a stable product means being able to supply the world with a product that can effectively assist in keeping viruses and outbreaks at arrest. However, the realization that the product needs to be able to accomplish this safely is of our top concern. While some of our competition have also brought forth their own products in answer to the COVID-19 pandemic, our Curie product is the only one of its kind to claim health safety for human use. Our main ingredient is a WHO approved food additive. And unlike some of our competitors, we do not use metals in our formulation. We do not use Zinc, Silver, Titanium, or other toxic metals when breathed in could pose long term health risks.

While some other competitors have contrived products that are safe, we have a product that is not only safe but also stable, cost effective, and scalable. Because we know that far beyond this COVID-19 pandemic, we have emanated a technical path for our product that is continually evolving into more products to fight the world of future bacteria and viruses.



Curie Story

Aldrin OR, graduated from Industrial Engineering of Hong Kong University of Science and Technology, and Rayman Gong, Postdoctoral Fellow of The Hong Kong Polytechnic University, were engaging on 3D printing of Micro Scaffolding of Human Tissue Reengineering by Continuous Liquid Interface Production (CLIP).



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.

When COVID-19 hit the world, the progress of this project is paused. Aldrin and Rayman thought the physical properties of protein based human cells, are similar with spike protein over COVID-19, therefore they tried to combine this composite with different fabric base with different manufacturing method, and it is the beginning of Curie.

Frequently Asked Questions

1. *Is there a protection level of the inlays, or other comparison which can be used, i.e. equal to N-95?*

For protection efficiency, I would like to raise one very important thing here. Full name of N95 is particulate respirator, it never mentioned they have ultrahigh efficiency on virus filtration. Testing method of N95 is blowing through NaCl on mask, and measuring how many NaCl penetrate the mask. NaCl is a completely different thing comparing with COVID-19. NaCl is neutral charge, it won't move at all. COVID-19 is in high negative charge, it will move, molecular motion of COVID-19 is very different from NaCl. If we want to arrest NaCl effectively, we will need electrostatic force to induce neutral charge particle and arrest them. If we want to arrest a strong negative charge, we need strong positive charge to arrest them. It is impossible to have 1 technical path to arrest everything effectively. If we need to do one job very good, we need to tailor make a technical path according to the physical properties of your target. We choose COVID-19 in this case.

In the University of Hong Kong, they conducted an experiment. In an enclosed area, they put a lot of boxes with a hole, and they use a very top quality Medicom mask to cover this hole. Inside the box, they put Syrian hamster inside it. They found even we put on a high-quality mask, infection rate of COVID-19 will only drop to 1/3, it never reach so-called 1% or 5%. In Belgium, healthcare workers wear N95, but 1/3 of healthcare workers are infected with COVID-19 there. This week, we are going to have discussion with Intertek and 3 professors on different professions, we all think current standard on mask got a loophole, we will come up with a better method to simulate transmission of COVID-19. If current standards work well, you will not see so many healthcare workers are infected.

We tested virus filtration efficiency (VFE) in Nelson Lab and Intertek, our filtration efficiency on virus is > 99.9%. We are confident that it is cheaper and better than N95, as we chose a better technical path than N95.

2. *50% more breathability compared to conventional masks of the same type, Is there a reference to this claim?*

If you need something got VFE 99.9a% and BFE 99.99%, and filtration efficiency will not drop in 5 years. Currently only Nanofiber can achieve it. Nanofiber rely on fabric density to arrest COVID-19, so it will be very stable, but the static pressure drop will become 2 to 3 times more than our filter material. If you have a chance to wear a mask with Nanofiber, you will experience hard to breathe.

There is no mask made of Nanofiber successfully passing ASTM F2100 or EN14683, they fail it because of static pressure drop.

3. WHO approval or reference on non-toxicity

It is related to our formula. Now our patent is in 18 months confidential period, so you will not search anything related to our formula or production method in any public database yet.

But we are very willing to share it directly with key technical team of UN, we got some very strong literature support on hand, once they see it, they will know why we are so confident on technical path. We don't want to make profit based on a killing matter. We hope to save as much as people life in a very affordable cost for poor people in Africa and India and South America. We sincerely hope we can launch this technical path through the channel from United Nations.

4. Do you have air permeability specifications?

According to ASTM F2100 and EN14683, our delta P is between 20~30 Pa/cm²

5. Besides pointing out the competitors "meltblown fabric" deficiencies, we will be asked on describing the technical detail on your product which make it possible to have the advantage over it.

Meltblown:

- Electrostatic force will be discharged during long haul transportation, so you will see there are very high infection rate among healthcare workers in US / Europe, while infection rate of healthcare workers are very low in Far East

- Electrostatic force is negative charge, COVID-19 become very strong negative charge after mutation. We are now relying on an unstable negative charge to arrest a target with strong negative charge. Therefore we got a fail results from many clinical test, when we use actual COVID-19 to test the effectiveness on controlling transmission of COVID-19.

Curie filter:

- Mutation trend of COVID-19 is becoming stronger in negative charge, then we use positive charge

- Electrostatic force is unstable, then we build a stable nano chemical structure that can maintain strong positive charge even after we condition our filter under 120C for 48 hours

6. The material presents and positions itself as a new polymer nonwoven fabric, allegedly with 153 patents from different countries. Okay, maybe. But where it was before the discovery of COVID-19? We are now looking at patents, looking at technologies from the same direction, and we are not invisible either to this company or this "super material" . All Hong Kong companies can be checked in China, but we do not see any operating with such a trademark CURIE. The file you

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provided does not have any reference links published in scientific journals or research centers regarding the effectiveness and general existence of this material.

Our first experiment started at 2020/2/28.

Originally we are not working in the "COVID-19" direction, we are building nano scaffolding for human tissue reengineering via Continuous Liquid Interface Production (CLIP). We made a solvent that got super high affinity with protein, we treated the nano scaffolding with this solvent, so human cells can grow along the scaffolding structure easily.

After COVID-19 arrived, everything stopped, then we think virus, bacteria and COVID-19 are made up of protein, especially spike protein over COVID-19. All over the world lacked meltblown for mask making. Therefore we tried to dip this solvent with all different kinds of nonwoven fabric, from water repelling to water absorbing fabrics, then we vaporized Staphylococcus Aureus and sprayed over them, and we found no bacteria can penetrate it in some fabric composition + some solvent combination.

We made a testing sample with the best combination, and sent it to US Nelson Lab to conduct Viral Filtration Efficiency (VFE) with Bacteriophage T4D (0.3um) as per ASTM F2101 standard, after 45 days of waiting, US Nelson Lab sent us a report that no virus can pass through.

We sent a sample to Beijing to conduct the Killing COVID-19 test as per ISO18184, after 30 days of waiting, Beijing sent us a report that 99.81% of COVID-19 was killed in the test.

We sent a sample to Guangzhou to conduct the Killing H3N2 test as per ISO18184, after 30 days of waiting, Guangzhou sent us a report that 99.99% of H3N2 was killed in the test.

We sent a sample to The Open University of Hong Kong to conduct the Killing Staphylococcus Aureus test as per BS EN ISO20743 Transfer Method, The Open University of Hong Kong sent us a report that 99.99% was killed in 60 seconds.

We patented in HK and US, and we put them in an 18 months confidential period. During the first 18 months, if someone copies me, I can jump out and sue them. After 18 months, the world will know how I do it, so I can have 18 months to prepare money for a patent lawsuit against China and India. It is a strategy.

We discovered it accidentally, then we figured out a technical path via numerous AB testing, we patented the whole technical path with a set of chemicals and fabric compositions that can arrest and kill virus and bacteria via strong polycationic charge in air filtration. It is a patent set, and it is a totally new approach for human beings, we are the first one in the world to discover it.

7. Speaking about the virus itself, you say that it has mutated, and its multiple number of spikes has increased. The such statement can be nominated for the Nobel Prize, at least. Frankly speaking,

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the structure of the virus is composed of proteins, where in the corona the part that first comes into contact is called the S-protein, and how they mutated there, we still don't know. But we know for sure that getting a sample of a virus for research is tantamount to a nuclear bomb in a laboratory in our time.

In 2013, New York State Department of Health already discovered S-Protein over coronavirus is strong negative charged.

In 2020/8-9, scientists discovered mutation of COVID-19 got 10 times more S-Protein as infection rate spiked.

You got something with a strong negative charge, and it got 10 times more, as a result, mutation of COVID-19 became much stronger in negative charge. It is a logical induction.

We rely on negative charge electrostatic force to arrest a strong negative charge virus, so it is failing, and you can see infection rates among healthcare workers. Statistics prove this induction already.

In the University of Hong Kong, they tested and verified that, even if you put on a meltblown mask, you still got 1/3 of chance to get infected by COVID-19.

Everything I mentioned is verified, once you connect those dots, you will know why masks can't stop COVID-19 like SARS, and once you know why, you will know the solution.

8. Reg. chart table PP1 PP2, and so below if you read, they are supposedly used in masks 3M N95. And at the beginning it is indicated that the material can be washed 60-80 times. Based on the table, they say that the material is PP2. But as a person who works with masks with respirators of the N95 class, I will say that PP2 and PP1 are fully deciphered as FFP1 and FFP2, and in fact speaking it is a meltblown which is made on oil mist, and not on something specific that can be machine washed. as mentioned in the article. FFP1 and FFP2 are not used in conventional medical masks (there the price will be 5-7 times more expensive for such a mask).

You get it wrong.

PP1 is linear polypropylene to make meltblown.

PP2 is copolymer polypropylene to make meltblown.

PP1 is a major ingredient to make good meltblown like 3M 1860, and it showed the efficiency of PP1 meltblown will drop from 99% to 75%, and Boston Northeastern University verified that 3M they received only got 75% left.

PP2 is so called rubbish dump sales masks, they are so cheap and everyone uses it, and everyone gets infected and now you know why.

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Electrostatic force will be discharged when they experience hot temperature and high humidity. Even if you use a plastic bag to seal it, it is still experiencing a hot temperature inside the container. Container itself can reach 58C, and the mask needs to stay inside the container for 30 days if I need to send it over Pacific Ocean.

FFP1 / FFP2 / FFP3 is mask standard according to EN149, it is nothing related to PP1 and PP2.

9. You claim it retains and kills germs even after washing (up to 80 times). - the article indicates that the product has a deadly positive charge for the microbe. Okay, then the electret is mixed in. I told you about electrets which are, and how long they live. When in contact with water, the electret (which is doesn't matter if it is organic or not organic) that is in the composition of the surface of the tissue is simply disassociated, therefore there will be no filtration and microbe capture effects at all. (And who will wash the mask 80 times?)

You can maintain a strong positive charge with a strong polycatic polymer structure, instead of relying on an unstable physical phenomenon. Our positive charge is 3 times stronger than Chitosan, it is the magic of Curie.

You can't use water to wash out strong polycatic properties for a chemical structure.

I am so happy that finally I got someone to understand the meaning of it from a technical angle, I am very happy to set up a WhatsApp group between you, Eric and me, so we can share our technical point of view deeply to win the war on COVID-19.

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