1. Anti-Virus Vs Anti-Bacteria
- There are only two types of films officially accepted as anti-virus film globally: Copper (Cu) and Silvernano type. Please see the link below.
  https://mbio.asm.org/content/6/6/e01697-15
- However, the use of Silvernano type is sharply lessening nowadays due to health safety concerns. Please see the link below.
  https://www.beyondpesticides.org/programs/antibacterials/nanosilver/health-effects
- In fact, there are no official government approved labs for testing anti-virus worldwide since viruses are dangerous to handle. Thus, authorities in Korea and other countries allow companies to display "anti-virus" based on the global official research papers about Copper(Cu) film.
- According to our research, however, the thickness of film must be 150mic in order to offer proper anti-virus properties. That's why we produce 150mic film.
- All other types are anti-bacteria, not anti-virus and they include Hydroxylapatite, ZnO, and so on (Please find the file attached.)

2. USP & Why are the prices of our product higher than other products?
- Copper (Cu) type : approved anti-virus method
- 150mic (containing a large amount of Copper that is essential material for anti-virus properties) : other products are mainly between 50 and 100mic
- The film must be replaced when the film is worn out. Normally, "thin" film in the elevator is worn out and has to be replaced more frequently.
- PE base (instead of PP base): much higher cost, higher chemical resistance. More flexible - easy to stick it over various shapes of objects.
- High film evenness enough to make printing on the surface possible: This requires a high level of technology and leads to longer & more stable adhesion of the film.

3. Do antivirus films need cleaning or maintenance?
- It is not necessary. The anti-virus performance is not affected by cleaners

4. Is there an expiry date for the antivirus film upon application onto surfaces?
- No particular expiration date. It needs to be replaced when the film surface is worn out/perforated. (It is normal that the button for the "1st" floor of the elevator is worn out fast and that's the main reason the film is replaced.)
- The coated type must be replaced quickly even though it looks fine since the coating layer itself is very thin. But our product is a mixture of copper (Cu) and other chemical materials in the whole film and the thickness is 150MIC.
5. Can we print on the antivirus film?
- Yes, it is printable. Normally it is difficult in this grade, but we made it possible through an intense R&D process. We are now shipping this to the US client in a container base and this function was their requirement for business with us.

6. Is there an expiration date for the antivirus if left unused?
- With respect to anti-virus performance, there is no shelf life.
- In regards to adhesive type, however, the adhesion can slightly start changing after 1~2 years. Nevertheless, there is no issue for usage normally.

7. How is the current market situation? Is Chinese companies also involved in this business?
- "Anti-virus" market is a pretty new and emerging market, while anti-bacteria market has long been around.
- There was an antibacterial film for a long time, but the effectiveness of traditional products was just for anti-bacteria and normally its level of effectiveness was "2".
- Korea suffered from MERS virus a few years ago and we developed a product to fight against viruses that are much smaller than bacteria. Its level of effectiveness is "over 5".
- However, this product did not gain popularity initially due to high price and it has recently become popular worldwide due to the novel Coronavirus.
- Still, a few Korean companies dominate the global market and the demand is much higher than the supply.
- So far, we haven't faced competition from Chinese products. We believe naturally imitation products would appear in the market soon, but it would take time for them to be popular as this is a highly quality-sensitive item and there is a widespread mistrust issue on Chinese products especially in the COVID-19 related products.

8. Can this film be used for (thermal) lamination and flexible packaging?
- No. For those applications, coated type must be used and it doesn't offer a proper performance for anti-viruses.

9. How well does the film hold up to cleaners? Alcohol, Ammonia, Sunlight, Weather, etc
- Color can change by outside environments such as sunlight, weather, etc. But, it doesn't affect the anti-virus performance and its durability.

10. What are the advantages from the product over those that use silver embedded in the film that releases ions?
- In 2015, Korea suffered from MERS virus with 36 death tolls. Past the crisis, Korean government and institutions endeavored to develop systems and products to fight against viruses effectively. As part of the efforts, they analyzed what material is the most effective in killing viruses and found out copper(Cu) is better
than silver and stainless steel in terms of anti-virus performance and also durability. Therefore, this type has become a kind of standard in anti bacteria & virus film in Korea.

- Silver nano products are nowadays hardly used in many countries due to health safety concerns. Films containing copper (Cu) are proven to be harmless.

https://www.beyondpesticides.org/programs/antibacterials/nanosilver/health-effects

11. How does the product hold up to cleaning? Does alcohol, ammonia, bleach or other harsh chemicals damage the film or lessen its efficacy?

- It has strong chemical resistance as it is polyethylene(PE) based. Any type of solvent can't melt it and there is no damage by acid alkali.

12. Does our film work for the touchscreen applications such as smartphone and tablet PC?

- No. touchscreen applications require high clarity and specific technology for adhesion. We’ve developed a product for this application and are waiting for a final approval from the global smartphone manufacturer in Korea. The result will likely come out in a week.
  Once we pass the comprehensive test, we can produce and ship the product immediately.
- But, those who are not sensitive to clarity use this film for the applications. Also the rear side of the devices are not affected by clarity.

13. Overview of Our Company (Manufacturer)

- Founded year: 2010
- Annual Revenue: USD 29 million
- Main businesses: various types of specialty film products.
- Manpower and Capabilities: Most of our members (engineers) are from LG Chemicals/Electronics and Samsung Electronics and most customers are global companies in and outside Korea. Therefore, our technology and Q/C level is different from other small & medium sized companies in this field.