COVID Information Commons (CIC) Research Lightning Talk

Transcript of a Presentation by Ying Zhong (University of South Florida), November 13, 2020

Title: *COVID-19: Sterilization Mechanism of Corona Discharge for Masks and Environment*

Ying Zhong CIC Database Profile

NSF Award #: 2030033

YouTube Recording with Slides

November 2020 CIC Webinar Information

Transcript Editor: Cora Cole

Transcript

Ying Zhong:

Slide 1

So this is Sarah (Ying) Zhong from University of South Florida. I'm very glad to share our story about fighting coronavirus with corona discharge. So when you hear about corona discharge, it's not as terrifying as the coronavirus, it is actually a very useful tool which we can use to provide a safe and convenient and affordable tool for everyone to get safe masks and safe services.

Slide 2

So I believe every one of us still has a very fresh and terrible memory of the severe mask and the disinfectant shortage. So this project was initiated at the beginning of this pandemic to overcome this challenge. Even with the time going on we are very happy to see that the shortage has been released significantly. However, when we're monitoring the situation and we interviewed with many hospitals and civilians and self-practice clinics, we find out that almost like one third of them are still reusing their masks, and they are still concerned about the safety of reusing them. And it's true that their concerns are correct, because based on some research data, we can still see a lot of filtration efficiency drop after certain kinds of disinfection treatment.

Slide 3

So but if we look at the microstructure of those masks, we don't, we cannot find specific deterioration—the reason for the filtration efficiency drop is actually mostly caused by the loss of the static charges in the masks, which are injected to them during their manufacturing process. And the difference between a mask with static charges and without static charges for an N-95 mask, it can be as much as 37% versus the 95% percent which it should have. So here comes our solution: it's that we are using corona discharge to disinfect and also recharge our masks. So that means after the corona discharge treatment, you can not only kill the bacteria or the virus, you can also restore the static charge it had, which is similar as the manufacture, after right after the manufacturing process. So with this way, we expect to see the microstructure not change, but the static charges can be restored and the viruses have been killed.

Slide 4

So this is some preliminary data we've got. So for the convenience of experiments, we use the *E.coli* as the most, the mostly used bacteria to test our disinfection efficiency. Up to now, we can reach a log reduction of 6 for *E.coli*, which means it is 6/9ths in the percentage. It is 1,000 times better than the more common disinfection technology we are using in our daily life, and also a lot of reduction on non-conductive surfaces (which is the most challenging kind of material which we can do this infection with corona discharge), now we can reach log reduction of three. And we believe if we improve our technology further, it can reach much higher log reduction in the future. And also, we tested our effectiveness against spores which are the most tolerant, like a microbacteria, to disinfect and so the log reduction now it reached three but in the future, we believe it can be further improved as well.

Slide 5

So, in terms of recharging, we discovered that even after treatment of one minute or even less than that we can reach a very stable charging effect and this stable charge can stay for days and even several weeks. And we also sent out our N-95 masks for filtration efficiency tests at Nelson Lab. After 15 times of our disinfection treatment, which you can see, a filtration efficiency of about 95 percent which makes us very excited to see that, because that means our treatment can allow masks to be used for up to ten times at least.

Slide 6

We also try- are working very hard to improve the broader impact of our technology. For instance we participate in multiple times of social media interviews and also we made a series of videos to teach the public how to wear masks correctly and how to reuse masks, and also we submitted an NSF-STTR proposal collaborating with a local medical device designing company trying to commercialize our technology by designing at least the two kinds of devices: one kind of them is to allow us to put our masks in, and after several minutes of treatment we can take out the mask and reuse them safely. And

the other one is a scanning device which we can use to scan the surfaces we have contact during our daily lives and reduce the amount of use of disinfectants. But just with this contactless and the scanning technology we can disinfect our surfaces, and we are trying to reduce the cost of those devices as well, so our target is to make it less than $50 for the public (so we are still on the way for that, of course).

Slide 7

So that's about it, our research. And we are actually very glad—this lightning talk has already connected me with Deborah, and we are thinking about further collaborations, so I look forward to more collaborations in the future. Thank you, everyone, thank you.