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Exploring Effective Methods in Masks: A Look at Airlock389 & Protecting Patients

Dr. Turck:
At the start of the COVID-19 pandemic, a shortage of effective masks for healthcare professionals was seen across the country. Shortly thereafter, as states began mandating mask-wearing for citizens, the supply of masks available to the public also decreased. This resulted in many consumers and clinicians making do-it-yourself masks and troubleshooting to find the most effective materials. But even before that desperate situation arose, one physicist was already exploring ways to improve mask technology with innovative materials to better protect us from viruses and harmful airborne particles. And that physicist is who we'll be speaking with today.

Coming to you from the ReachMD studios, this is *COVID-19: On The Frontlines*. I'm Dr. Charles Turck and joining me is the Chief Science Officer and CEO of Airlock389 Mr. Chris Cooper. Chris is an interdisciplinary physicist by training with over 30 years' experience in commercialization. Chris, welcome to the program.

Mr. Cooper:
Thank you for having me.

Dr. Turck:
Now to help set the stage for us, Chris, would you give us an overview of the mask technology that we typically have access to at the present time?

Mr. Cooper:
Yes. So the current mask technology is based on a size exclusion, filtration matrix, where the nominal size of particle exclusion is around 300 nanometers. So the mask is good for large, dust particulate, large being a micron down to hundreds of nanometers in diameter.

Dr. Turck:
And recently, because of the COVID-19 pandemic, we've all seen shortfalls in not only the access to effective masks, but also in mask technology itself. Would you tell us a little bit about that?

Mr. Cooper:
Yes. So the current mask technology for protecting people from viral, pathogenic agents is quite ineffective because of that large pore size, a little like trying to stop mosquitoes with chain link fence. So there's been a great deal of effort toward building a mask of purification media that can deactivate viruses. And most of the effort has gone into things like metals, dispersed and absorbed onto the surface of the polymer fibers, or even chemical toxins absorbed into the fabric that can stop and deactivate a virus. So that's what I've seen in terms of the bulk of the effort toward a much more effective mask and it's all over the map, from small particulates of material, such as graphene platelets, all the way to the use of UV lamps in a face mask.

Dr. Turck:
For those just tuning in, you're listening to *COVID-19: On The Frontlines* on ReachMD. I'm Dr. Charles Turck, and I'm speaking with Mr. Chris Cooper from Airlock389 about current and future mask technology.

So Chris, now that we know more about some of the shortcomings of current mask technology, would you tell us about your patented technology? What's it made of, and what are some of its key features?

Mr. Cooper:
Yes, certainly. So over the last twenty years, I've been researching the use of very small carbon materials. This material's got the

properties of nanoscale thread. My first effort was in the use of carbon nanotubes for purification media and my first test was born out at the microbiology department at Dartmouth twenty years ago. And in the last five years, the technology that I've been able to advance significantly. We're using a graphene mesofiber, 80 to 120 nanometers in diameter and about a millimeter in length. These particular fibers are capable of donating electrons to the substrate material, which is a polymer felt and when they do that,, they then have a voltage or a charge; that voltage or charge, in turn, is the active agent that can deactivate the virus through an unzipping mechanism that unzips the protein shell. So the purification media doesn't actually have to capture or absorb the virus to the surface of the grapheme fiber; it works when the virus comes into close proximity to the fibers.

Dr. Turck:
And as I understand it, your technology has gotten the attention of NASA and our military. So what type of applications could it be used for to help protect our astronauts and service members?

Mr. Cooper:
Over the years, I've received significant funding from the U.S. Airforce, through the Human Effectiveness Directorate at AFRL. And we also received a phase 1 SBIR from NASA that was very successful. They gave us a phase 2 SBIR that put my technology on the international space station for water purification. We were able to remove all the pharmaceuticals from the water as a polishing stage to what they currently had at the time. And this was back in 2007. Then Dartmouth came to me and said, "Could you use your material to remove weaponized biological agents?" and I said, "Don't know about that but we can certainly try." We did, and we were very successful at removing those agents. Now in the year since, I've gone into what I call a second-generation technology; that work was done with a much smaller carbon fiber and the carbon fiber I'm now using has significant advantages over my previous technology.

Dr. Turck:
And just to bring all of this together, Chris, when might you begin to see technology like Airlock389s available to the mainstream healthcare system and to the general public?

Mr. Cooper:
So we are moving through our entire FDA, EPA, and NIOSH certification presently. Our mask is available through a field study program that will be available here in just a few days, we're bringing up our website so that people can sign up for our field study and participate. So, we'll provide this mask at a significantly reduced price, and if the participants fill out all of our surveys, we will then send them, free of charge, another mask once it's been fully FDA approved.

Dr. Turck:
Well, it's clear from our discussion that there's still room for improvement in mask technology. And I wanna thank my guest, Mr. Chris Cooper, not only for joining me today, but for working to advance mask technology to help keep us safe during the COVID-19 pandemic and beyond. Chris, it was great having you on the program.

Mr. Cooper:
Thank you so much.

Dr. Turck:
I'm Dr. Charles Turck. To access this and other episodes in our series, visit ReachMD.com/COVID-19, where you can Be Part of the Knowledge. Thanks for listening.