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IIT-G develops antimicrobial spray-based coating for PPE

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The team also developed 3D printing â??Ear Guardâ?? for face masks



A team of researchers of Indian Institute of Technology Guwahati (IIT-G) has developed affordable antimicrobial (antiviral/antibacterial) spray-based coating for Personal Protective Equipment and 3D printed Ear Guard for comfortable use of face masks by healthcare workers.

The concepts have been developed by Dr. Biman B. Mandal, Professor, Department of Biosciences and Bioengineering, IIT Guwahati, along with his PhD scholars, Bibhas K. Bhunia and Ashutosh Bandyopadhyay.

Talking about the work, Dr. Biman B. Mandal said, “Effective yet affordable technologies are need of the hour for India. We at IITG under the leadership of our Director, Prof. T.G. Sitharam, are committed to contribute to the nation’s immediate need at this hour of COVID-19 crisis.”

Antimicrobial Spray-based Coating for Personal Protective Equipment: Personal Protective Equipment (PPE) that are being used presently are designed to protect the wearer from infectious microbes/aqueous virus droplets acting as a barrier. However, these PPE, generally, do not have the ability to prevent the spread of microbes as the surface of the fabric readily allows adherence and accumulation of microbes with time. This leads to further spread of the microbes due to negligent handling of PPE and wrong disposal protocols.

In an attempt to safeguard healthcare workers and citizens from current Coronavirus crisis and other infectious diseases, the research group has developed an affordable antimicrobial (antiviral/antibacterial) spray-based coating for Personal Protective Equipment (PPE) kits to kill and prevent the spread of microbes once they come in contact with the coated PPE surface. The strategic association of metal nanoparticle cocktail, such as copper, silver and other active ingredients, present in the spray acts as an antimicrobial agent. This ensures limited penetration and accumulation of microbial contaminants on PPE. Thus, the coating has the potential to reduce the risk of secondary infection by limiting the transmission of the microbes.

The innovation is affordable and readily deployable using existing infrastructure available with PPE manufacturers. It can be spray/dip-coated onto any kind of surface including textiles and other medical device surfaces to get rid of microbial load. This will allow reusability of PPEs and easy containment of the microbes.

The research team has developed the prototype of the technology. Further validation of product safety is ongoing and antimicrobial action specifically against Coronavirus will be done at a government facility. The team has filed for a Provisional Patent for the technology.

The technology has several advantages like:

- Killing of microbes will allow reusability of masks and other PPEs. Hence, less burden will be on the manufactures for making millions of masks which are generally thrown away after single use
- Restrict spreading of microbes to fingers and other individuals due to negligent usage of masks where users tend to touch them while removing
- Reduce bioburden and transmission after disposal
- The affordable technology can be implemented through a one-step facile spray/dip method using existing industry infrastructure to coat fabric materials which are commonly used for mask/bodysuits.

The technology has been developed by Dr. Biman B. Mandal along with his PhD scholar, Bibhas K. Bhunia.

3D Printed Ear Guard for Comfortable Use of Face Masks by Healthcare Workers: Long-time usage of strapped and tight-fitting face masks is painful to the ears. This has been a major concern with healthcare workers who have to wear these masks for hours during duty cycle. Even for commoners during corona crisis, masks are to be worn constantly. To address this critical issue, the research team has 3D printed ‘Ear Guard’ prototype.

The ergonomical design of the guard holds the face mask strap in a place without giving pressure to the ear. Therefore, masks can be worn effortlessly for hours without pain or discomfort to the wearer. Using 3D printers, these ‘Ear Guards’ are being made in a free size to fit all.

These are being printed at the Biomaterial & Tissue Engineering Laboratory of IIT Guwahati using polymer resins. The ear guards are affordable, long-lasting and designed to give comfortable wearing experience. Presently, the team is printing thousands of these ear guards to be distributed to hospitals across the Northeast Region and if needed, across India.

3D Printed Ear Guard has been designed and printed by Dr. Biman B. Mandal along with his PhD scholars, Ashutosh Bandyopadhyay and Bibhas K. Bhunia.