HelloMask: First transparent surgical mask goes to manufacture

By Dental Tribune International

DÜBENDORF, Switzerland: Researchers of the Swiss Federal Laboratories for Materials Science and Technology (Empa) and the Swiss Federal Institute of Technology in Lausanne (EPFL) have jointly developed a fully transparent surgical mask that is intended to replace the three-layer mask normally worn by medical staff. The mask was developed primarily with the aim of improving non-verbal communication between nursing staff and patients but could also be worn by dentists to protect against transmission of bacteria and viruses, such as SARS-CoV-2. The product is expected to be launched in early 2021.

In the past two months, people in many places have experienced how strange it is to talk to a person whose face is partially hidden by a mask worn to protect others and the wearer from SARS-CoV-2. While this makes it more difficult to decipher facial expressions and impairs acoustics for most, especially for children, the elderly and the hearing-impaired, the masks pose a major obstacle to communication. Owing to these difficulties in the context of surgical masks worn by healthcare providers, a team of researchers from Empa and EPFL’s EssentialTech Centre has been working for the past two years on a completely transparent surgical mask. The researchers have now finalised the material, which is made of organic polymers, and recently founded the start-up company HMCARE. After completing a
CHF 1 million fundraising round, the company is ready to move into the production phase.

Transparency, resistance, porosity
Dr Klaus Schönenberger, director of the EssentialTech Centre, which is involved in the provision of modern technology and humanitarian measures to developing countries, was working in western Africa during the 2015 Ebola outbreak. “It was touching to see that nurses—covered from head to toe in protective gear—pinned photos of themselves on their chests so that patients could see their faces,” he said.

The following year, Schönenberger was approached by Dr Thierry Pelet, now the CEO of HMCARE, and Dr Sai-chu Sidjanski, a project manager at EPFL’s School of Life Sciences, with an initial design for a transparent mask. Motivated by his experience in Africa, Schönenberger did not hesitate Pelet and Sidjanski were inspired by Diane Baudart, who was formerly engaged in storytelling to seriously ill children at Geneva University Hospitals. She thought it was a pity that the children could not see her facial expressions while she was telling stories.

“You can find prototypes of masks that are partly transparent, but they’re just normal masks with some of the fabric replaced by clear plastic,” said Pelet. However, since this plastic is not porous, it impedes breathing comfort and makes the mask moist. Over two years, the Empa and EPFL researchers were able to combine transparency, durability and porosity optimally. The result was a membrane made of a polymer specially developed for this application. “We can produce fine electrospun membranes with a pore size of about 100 nm,” explained Dr Giuseppe Forzano from the Laboratory for Bio- mimetic Membranes and Textiles at Empa, who developed the material together with Empa postdoctoral fellow Dr Davide Barana. The structure of the fibres creates extremely small gaps that allow air to pass through but not viral and bacterial particles.

In order to guarantee optimal protection, the new masks—just like surgical masks currently in use—are intended for single use. The question of recycling or the use of a biodegradable material was raised at the very beginning of the project. “Our masks are made of 95% biomass derivatives, and we will keep working on them until they are completely eco-friendly,” commented Pelet.

Production facilities in Switzerland
The material is made using electrospinning, for which electric force is used to produce a mat of polymer fibres, and the researchers have adapted the method slightly for large-scale production. The material will be generated in spools, from which individual masks can be cut and assembled. While the research team initially planned to fabricate the masks in Asia, it is now considering keeping production in Switzerland. In light of the increased demand for conventional surgical masks owing to the SARS-CoV-2 pandemic, production lines should soon be in place and the developers foresee no problems in this regard. Pelet is currently negotiating with several companies and authorities.

The general demand for protective masks owing to the pandemic has made it easier for HMCARE to find investors. The HelixMask project was initially supported by a dozen non-profit organisations and later by the Swiss Innovation Agency. While the masks will first be sold to the medical community—including dentists—they may eventually be marketed to the general public.

Bien-Air has always prioritized provider and patient safety by developing products that protects against cross contamination. With the COVID 19 Pandemic, these features are more important than ever.

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