Engineered face masks to detect COVID-19

Pranjal

Synthetic biology could be integrated into wearables like masks as this could help in monitoring pathogen exposures. The masks for COVID-19 are being designed in such a way that the user can activate them at any time with privacy in results. Recently a mask has been engineered by researchers that could diagnose COVID-19. This mask consists of sensors that are freeze-dried, embedded inside the synthetic fibre and further surrounded by silicon elastomer. The freeze-dried sensors are in inactivated form and the sensors are activated by pressing a button on the mask which releases water around the sensor. The sensor used for detecting COVID-19 is the SARS-CoV-2 sensor. A CRISPR-based technology is employed to sequentially extract, amplify and detect viral DNA by incorporating a series of microfluidic chambers in the mask. The results are obtained by hydrating the freeze-dried components of the sensor. The sensor reads the accumulated breath droplets inside the mask and gives the result within 90 minutes. The result is predicted by colour change fluorescent/luminescent signal read with a handheld spectrometer. The biosensors can be integrated into other garments and this technique can also be used for detecting bacteria, toxins and chemical agents by using an appropriate sensor for each of them. The diagnostic centres are shrunk down into small, synthetic biology-based sensors that work with any face mask and combine the high accuracy of PCR tests with the speed and low cost of antigen tests.

Keywords: Freeze-dried components, SARS-CoV-2 sensor, Fluorescent signal, Spectrometer, Silicon elastomer