

Corona Surrogate Virus Trapping Device

Problem Statement: Doctors and healthcare workers are the most vulnerable to coronavirus infection, specifically while performing a surgery. COVID-19 infected individuals who need surgery by Laparoscopy should be operated on with the utmost care due to the chances of virus carryover through the pneumoperitoneum gas. The aim of this study was to completely remove the virus entrapped in the aerosols of pneumoperitoneum gas stream by passing it through the modified polysulfone/polyvinyl pyrrolidone (P) hollow fibre membranes (HFMs). The developed device provides a low-cost solution to protect healthcare workers from the virus; if not, at least decrease the viral load.

Uniqueness of the Solution: The Corona Surrogate Virus Trapping Device could be the only HFM based device in the market for its application in operation theatres. This device efficiently removes the virus without affecting the pressure drop in the

laparoscopic exhaust line. These HFMs-based products have ~98.99% removal efficiency toward bacteria when tested on agar plates using samples from the gas streams. In addition, the preliminary virus studies showed 10⁵ orders of magnitude reduction in virus (surrogate coronavirus).

Current Status of Technology:

The virus trapping device is ready for demonstration in an operational environment. The device consists of a bunch of porous HFM, which can trap coronavirus in its pore. In addition, a UV lamp is attached in series to the HFM module for higher safety. The device is ready for transfer to the industry.

Societal Impact: The healthcare system is at the epicentre of this unprecedented global pandemic challenge. Healthcare workers on the front line are most susceptible to catching the virus. The product could be useful in every laparoscopic operation theatre. It will help protect healthcare workers or at least



Figure 2: Agar plates showing plaques formed by the virus A) inlet to the module (B) after 10 min, (C) after 30 min and (D) after 60 min of experiment at the exit of the module

decrease the viral load, which can save their life.

Patent(s): In the process

Relevant Industries: Healthcare, Air Handling Units, Endoscope Manufacturers, Insufflators, Materials.

Faculty: Prof. Jayesh Bellare, Chemical Engineering.