



**Institute of Nuclear Medicine and Allied Sciences**  
Brig SK Mazumdar Marg, Delhi-110054, India

# TECHNOLOGY TRANSFER DOCUMENT

**"Ultra Swachh Personal Protective  
Equipment Disinfection Unit (Tri-Netra)  
: Multi-Product"**



# Technology Transfer Document

## Ultra Swachh

Personal Protective Equipment Disinfection Unit (Tri-Netra):  
Multi-Product

U<sub>s</sub> Technology

**Developed by**

**Team, Division of CBRN Defence**

August, 2020'

First Prototype Delivery: May' 2020'

First Product Launched by DRDO: June, 2020'

Multi-Product (U<sub>s</sub>) Series Delivery : October, 2020'



## Institute of Nuclear Medicine and Allied Sciences

Brig SK Mazumdar Marg, Delhi-110054, India



For Gel Craft Healthcare Pvt. Ltd.

(Authorised Signatory)  
M/s Gel Craft Healthcare (P) Limited



**ULTRA SWACHH**

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**STEPPING TOWARDS SELF RELIANT INDIA**

*[Faint signature and text]*

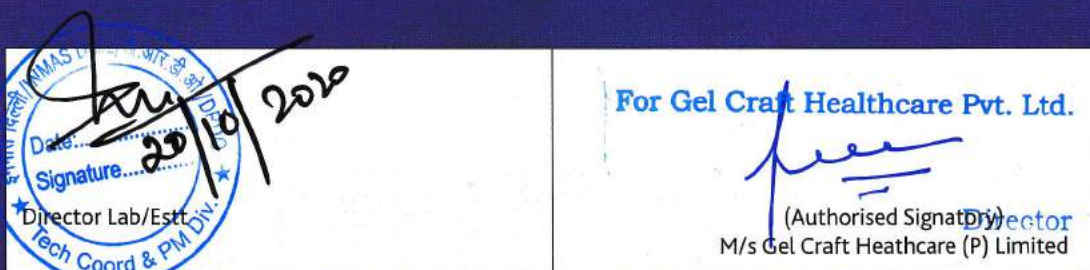




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## Contact Details





## Ultra Swachh Technology

COVID-19 Pandemic is unique due to fact that average R value (Reproduction number R) of SARS-COV-2 is ~2.5 indicating its high potential to spread. It can be transmitted by multiple pathways. It could be contaminated hand coming in contact with facial mucous membrane (31%); direct inhalation of cough particles during sneezing or closer contact with infected patient (17%); inhalation of inspirable cough particle (0.52%) and; spray of cough droplets (52%) on facial contours. The total period of infectious cycle is also longer than novel H1N1 (2009 pandemic) making patients requiring hospitalization for longer periods subjected to exposure of opportunistic pathogens. SARS-COV-2 persists on surface/ layers ranging for 30 min on paper or tissue to 7 days on outer layer of surgical masks. Such range of persistence makes it potential candidate for effective measures in place to prevent its spread. Infectious Control Measures at hospitals with new technological innovations as well as community based safer measures for prevention of spread of SARS-COV-2 is need of the hour. In April, 2020 (one month post lockdown period in India), Division of CBRN Defence initiated exploration of possibilities to address these issues in perspective of Indian scenario. The first sterilient comes into consideration is UV-C being deployed by many countries.

UVC light has been used extensively for disinfection of drinking water, waste water, air, pharma products, and surfaces against various human pathogens (bacteria and viruses). All bacteria and viruses (including MERS-Cov & SARS-Cov) tested to date respond to UV disinfection (at appropriate doses). UVC in the range of 240 to 270 nm has strong germicidal effect with its peak at 265 nm. Pathogens in light of sight can be deactivated thus folds crevices, multiple layered components cannot be deactivated. To address this problem, we consider another Sterilient i.e Ozone.

Ozone is considered category III sterilient under "GRAS" category and even used for curing and strengthening of

multiple fabrics. It is only gas referred as organic despite it's inorganic nature. It is used as safe additive in food products [USDA National Organic Program (NOP) 205.605 (b) (20)- pg.437]. It's already been practiced to use as industrial sterilient. It's oxidative potential is 2.80 V which is 3000 times higher than chlorine. It is used for Advance Oxidative Process (AOP) while using it with UV at 254 nm. Such dual fusion showed a guided path ahead.

Presently, single sterilient technologies do exist like Hydrogen peroxide vaporized sterilization solution; Ethylene Oxide EtO or Steam based systems. However, each one of the solution has few problems: (a) Continuous Recurring Cost is higher; (b) Environment Friendliness is questionable; (c) Non-compatibility with range of material however still comparative research is required at different levels; (d) Lesser oxidative potential of single sterilient technology with respect to such dual/ tri-technological combinations. Mostly are standardized and developed outside the country, thus generally imported. Accordingly, the technological innovation was explored with respect to advent of COVID-19 spread and as a technological solution towards "self reliant Indian mission".

Based on above analysis, it was understood that 'single sterilient' solution are available but dual fusion require specific targets while triple or quadra fusion of disinfection technologies in single structure is missing. Accordingly, a concept of combining dual or more than two disinfection technologies was focused and referred as 'UltraSwachh' (U<sub>s</sub>) Technological Initiative. We used (a) Ozone as primary sterilient (in both gaseous alone or mixed with water); (b) UV-C with dual purpose: Secondary Sterilient as well transformation of ozone back to oxygen and; (c) development of safe radical dispenser specific to SARS-COV-2 and neutralization of hospital induced infections, in addition, it should work as sync ozone candidate. A large number of assemblies and fabrication models are designed to suffice the needs of



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Figure 14: Evolution of Products and Devices from Ultra Swachh Technology (combination of multiple assemblies/ processes in integrated manner)





<sup>1</sup>ORCS Swachh Heat Sensitive Medical Device Disinfection Unit (variants)



<sup>2</sup>ORCS (Poorn Swachh)



ORCS (VISANKR)- Confined Space Sterilization Device

<sup>3</sup>Taaran (Safe Passage) Patient Transfer System



<sup>4</sup>ORCS (Vayu Swachh)



<sup>5</sup>ORCS (Vayu Swachh-HVAC)



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