



IIT Kharagpur

Webinar on 18.04.2020

Research and Development of PPEs

A Hazmat Suit with Forced Purified and Cooled Air Circulation for Medical Professionals and for other bio-hazard environments

Two Embodiments

- i. Air passes through sterilizers and filters and reaches to the mouth-nose of a person with the suction force of breathing and exits through a separate sterilized vent. (no pump or cooling is involved).
- ii. Air is forced to pass through two sterilizer chambers and multiple filters and get cooled (optional) by thermoelectric module before entering into the interior of an airtight suit and exit through sterilized vent.

Objective
Absolute safety

Objective
Absolute safety and comfort

Organizer: Confederation of Indian Industry

The Executing Team



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Area of research: Multidisciplinary product development

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Area of research: BioMaterials and Tissue Engineering, metal and ceramic based permanent implants, Bioactivation/ modification of implants

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Area of Research - Materials, Nanotechnology , Chemicals, Nano biotechnology

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Credentials of Prof. Pramanik



- Area of Research - Material , Nanotechnology , Chemicals, Nano biotechnology
- Served as faculty from 1977 to 2014 with three years special extension
- Founder of Nano-biotechnology division of DBT in India
- Received medal from Chemical Research Society and Material Research Society of India
- Ph,D produced -37 and 3 are in process
- No of papers in international journals- 295
- No of patent sold to industry -3
- Constructed first nano - reactor in BHEL to produce nano-sized ceramics for in house use
- Developed sensor for Atomic reactor in Kalpaakkam
- Technologies developed (patent filed)
- 1) Green pesticides from clay (GLA Uni)
- 2) Water less Privy for arid land of western India (GLA Uni)
- 3) Cleaning of drinking water by Sunlight for rural sector (GLA Uni)
- 4) Removal of Boron from industrial waste water from 20 ppm to 5ppm (Arachem Sdn Bdh Malaysia)
- 5) Synthetic Bone charcoal for removal of color from food products (Arachem Sdn Bdh Malaysia)
- 6) Anti sprouting agent for potato using simple chemical (ISI)
- 7) Controll of urea loss in soil (ISI) using sulphur compound
- 8) New synthesis of graphene powder (Jdavpur Uni) along with several sensors for aroma of spices and
- detection of TB from breath

Showcase your Technology and its Features (1 Slide)

- i. Air is forced through sterilizers and filters to remove all pathogens
- ii. Air is cooled using thermoelectric cooling process
- iii. The clean and cooled air is to be circulated inside a head-gear or a full suit.
- iv. The head-gear or the suit is airtight.

Pumping the air

- i. Using a centrifugal pump operated by battery
 - ii. Using compressed air in a cylinder
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- i. Absolutely clean air for breathing. Most other system is only partly safe (95% for N95 mask).
 - ii. Air is circulated within the suit for keeping the body dry and comfort to the person.
 - iii. Air is cooled for further comfort.

Current State of Development

- **The product is in the research stage. However, all the components are readily available in the market and a working prototype can be built in less than a month.**
- **Testing can be done as soon as a working prototype can be built.**
- **Pilot run and testing can be started in 30 days.**
- **All the raw-materials are available locally.**
- **Rough estimation of product cost has been done.**

Core Knowledge

- We have identified two different chemical formulations by which COVID-19 and all other viruses will be adsorbed in the chemical as the air will pass through this chemical and one of the components will kill the virus.
- We intend to use both the chemicals simultaneously to ensure more than 1 factor of safety.
- The clean air will pass through a series of filters to make it absolutely fit for breathing.
- Air will be circulated within the space between the body and the garment to dry the sweat and provide comfort.
- Positive pressure will be maintained within the suit.

Current State of Development

- **Technology will be transferred to willing and capable manufacturers for commercial production.**
- **ICMR may be approached for certification.**
- **We are yet to identify potential customer for the technology.**
- **Investment of ₹5.00 lakh will help us complete the research work and build prototypes of the two embodiments.**

The final products have the potential to emerge as a product for everybody needing protection from any kind of biohazard.

Unlike N95, the proposed system offers 100% protection, covers nose, eyes, ears and all possible loopholes.

Support required

- **Financial:** ₹ 5.00 lakh
- **Marketing:** Required. Should be done by collaborator
- **Outsourcing:** Prototyping facilitation will be very helpful
- **Technology Transfer:** Support necessary
- **Networking:** Support necessary
- **Any other support** Networking with someone for prototyping would be of great help
Need to connect with the suit manufacturer.

Thank you