Support to Madhya Pradesh during COVID -19 as well as for management of various other diseases such as TB etc since 2014

CSIR-AMPRI, Bhopal is one of engineering lab under CSIR. The Institute is working in the areas of following areas:

i. Light weight material
ii. Bamboo Composite material
iii. Waste to wealth value added material
iv. Radiation shielding material.
v. Cement free concrete material
vi. Nanomaterial
vii. Applied biomaterial
viii. Water resources and rural technology

CSIR-AMPRI has been in the forefront during COVID -19 and undertaking research problems in health sector. Institute developed relevant

technologies/knowhow and also transferred to the industrial partners, distributed masks and sanitizer, organized online meetings with the students of Kendriya Vidyalaya and Navodaya Vidyalaya's. The details are as under:

1. CSIR-AMPRI has developed technology/knowhow with the name AMPRICARE: SANITIZER AND FACE MASK
   The technology/knowhow has been transferred to M/S MW Social Enterprises, Indore on 11.05.2020 (National Technology Day). The details about both the products are attached herewith as Annexure C1 and C2. Party has started the production of face mask and the product is now available even on AMAZON.
2. Institute has developed and transferred one technology/know how on Disinfectant box

(UV rays-nanomaterial hybrid technology). The technology/knowhow transfer took place on 28.02.2021 on National Science Day.

The party is in the process of producing the products. The details are attached of the technology/Knowhow are attached as Annexure C3.

3. Institute distributed sanitizer and masks to people of Madhya Pradesh and Chattisgarh including villagers, bank and police officials and common public. The details are attached herewith as Annexure C4.
4. Institute organized number of programs online to the students of Kendriya Vidyalaya and Navodaya Vidyalaya for sensitization about COVID 19 and necessary precautions. The details may be seen at Annexure C5.
5. CSIR-AMPRI developed technology / knowhow for removal of arsenic and fluoride and

transferred to three industrial partners. Two of which are from Madhya Pradesh i.e.

- Deflouridation of drinking water using Nano adsorbent based domestic filter to M/S MW Social Enterprise Private Limited,383, B Block Silicon City, A.B. Road, Indore, M.P.-452001 on 01.01.2018
- Nanoadsorbent-Nanobiocides based membrane filter for the removal of arsenic, fluoride,micro-organisms etc of drinking water to M/S IBS Water Nano Purifer LLP, M-252 Arvind Vihar, Bagmugalia, Bhopal-462043 on 01.01.2021.

The details may be seen as Annexure C6.

6. A technology/knowhow for Make shift clinic developed and transferred jointly with CSIR-CBRI, Roorkee to M/S JT Events, Bhopal. With the support of Madhya Pradesh Council of

Science and Technology, Bhopal a demonstrational structure of make shift clinic has been developed at JP Hospital. The same is proposed to be inaugurated by Hon Minister during his visit. The details can be seen at Annexure C7.

7. A project with AIIMS, Bhopal has been sanctioned by SERB, Government of India entitled, “Development of rapid electrochemical based diagnostic for detection of SARS-COV infection” with a total outlay of Rs. 58 lakhs for 3 years. The project is having application towards diagnostic kit for detection of SARS COV 2.
8. MOU with AIIMS, Bhopal is also under finalization.
9. Surface Plasma Resonance Raman Substrate knowhow has been transferred to M/S Technos Instruments, Jaipur on 03.01.2020 during Indian Science Congress, Bengaluru, 2020. It shall be

used for checking adulteration, pharmaceutical APIs and communicable disease.

10. A project on Bioinspired Catechol amine coated carbon nano materials for the development of biosensors for TB (Tuberculosis) detection sanctioned by CSIR.

11. SERB sanctioned a project entitled, “Development of Graphene based Nano fibrous antimicrobial wound dressings for chronic wound infections and skin regeneration”.

12. A MOU has been signed with MP state council for science and technology to construct fever clinic in the state of Madhya Pradesh.

13. Radiation shielding tiles have been developed by the Institute. The technology has been transferred to two industrial partners i.e. M/S Prism Johnsons, Mumbai and M/S Assurays, Noida. A demonstration has been made at Saideep Hospital at Ahmednagar,

Maharastra. The advancement of the work in the area of radiation shielding shall be taken up in the Center proposed to be inaugurated by the Hon. Minister for Science and Technology. The ultimate is to cater the needs of Madhya Pradesh and then nation.

14. CSIR-AMPRI also designed and distributed specialized 3 D printed face shield

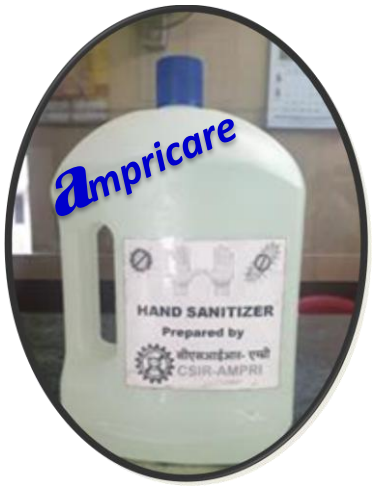
Annexure C1

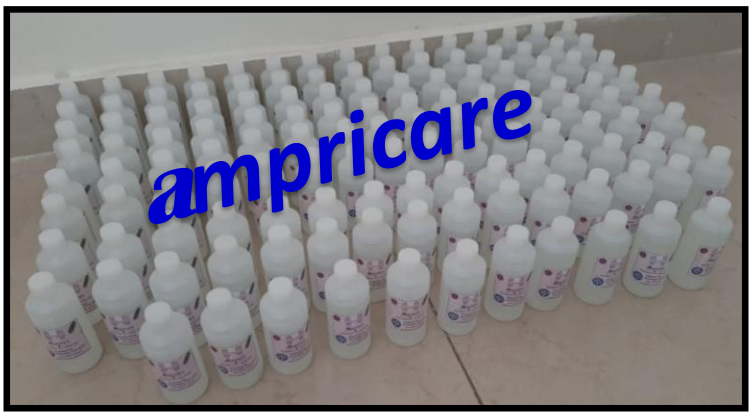
Hand Sanitizer with Enhanced Skincare

- Hand sanitizer is a frontline weapon to combat infectious diseases including COVID-19. When the soap and water are not available, hand sanitizer is the only easiest way to disinfect hands. In recent infectious scenario, the increased demand and high market price of hand sanitizers have motivated to develop cost-effective and improved hand sanitizers.
- CSIR-AMPRI has developed alcohol (isopropyl alcohol)-based hand sanitizer compliant to WHO guidelines. As the excessive use of alcohol and other chemicals-based sanitizers may cause skin discomfort in terms of dryness of the skin, etching and irritation, CSIR-AMPRI has come up with an improved formula. Our hand sanitizer contains various natural/herbal ingredients that

enhance the skincare and also provides fragrance to the hand sanitizer, and the content of the fundamental chemicals such as alcohol was also kept perfect so as to maintain its efficacy against germs.

- CSIR-AMPRI made hand sanitizer that kills 99.99% germs (tested by NABL accredited lab)
- Cost: Approximately Rs. 190-200/ litre.
- The technology has been transferred to a start-up company M/s M W Social Enterprises, Indore.
- Few more start-up / MSME industries have shown interests on this product.





Annexure C2

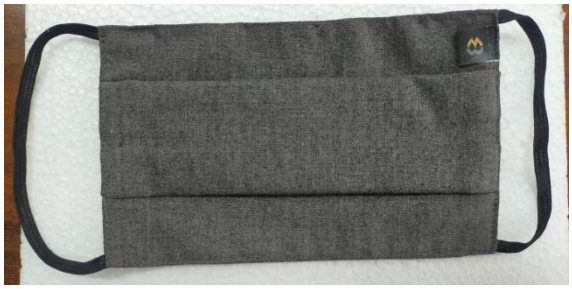
Ampricare - Face Mask for Common People

A pandemic Coronavirus infection (COVID-19) is s a matter of great concern all the world. To control spread of infections, mask is as part of a comprehensive strategy of measures to suppress transmission and save lives. All the states have made facial masks compulsory for anyone going out of their house. Masks are recommended as a simple barrier to help prevent respiratory droplets from

traveling into the air and onto other people when the person wearing the mask coughs, sneezes, talks, or raises their voice. Continuous efforts are going on to find suitable ways and materials for making face masks. CSIR-AMPRI, Bhopal has developed face masks which can be easily availed by the common people for protection purpose. These masks are triple layered, both upper and lower layers of cotton cloth with an intermediate layer of filter fabric. They are suitable for Indian weather conditions, and comfortable for use for long time duration without causing any discomfort. Elastics have been used to facilitate adjustability. Size of mask ensured so as to provide minimum exposure and maximum protection. They can be gently washed and can be reused after washing. It is better to use these types of masks as they offer some protection especially where social distancing is difficult to maintain. They reduce the risk of people without symptoms

transmitting the virus through speaking, coughing or sneezing. They are recommended in addition to follow the rules of social distancing and hygiene practices like washing the hands with soap or with alcohol-based sanitizer.

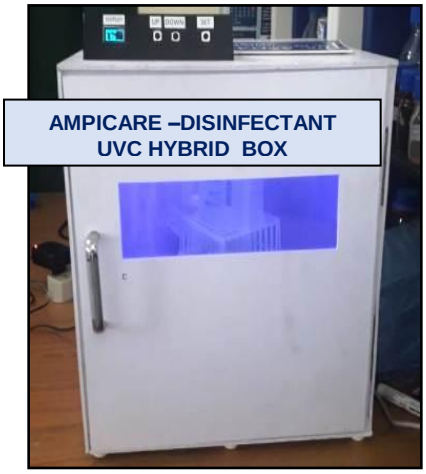
The technology has been transferred to a start-up company M/s MW Social Enterprises Pvt. Ltd., Indore



Ampricare face mask

Annexure C4

AMPRICARE- DISINFECTANT BOX (UV Rays Hybrid Technology)



The AMPRICARE- DISINFECTANT BOX (UV Rays Hybrid Technology) is a unique box which consists of a closed space, UVC light source, a sensor, rotator base, adjustable solar panels, Digital OLED display, control software application, coated base /wall from inside. It is made up of optionally using novel and unique rectangular / square opaque

panels which are developed by advanced hybrid material encapsulated nano to submicron to micron sizes polymeric based material which also helps in providing UV radiation shielding effect to the outer environment.

The floor/ base consists of a complete 360-degree rotatory system with a dually coated tray so as to sanitize the material completely from each angle. The upper roof top consisting of UVC disinfectant sanitizer lamps with UV C germicidal light with appropriate and suitable frequency/wavelength necessary for killing germs, microbes, virus, bacteria's etc. It further consists of additionally adjustable solar panels around it, so as to maintain the constant supply and to use natural solar energy for recharging of battery and thus to continue the operating the system. The equipment is further coupled with automatic sensor system, which senses the material when kept in the equipment for

sanitization and thus operates. The equipment is powered with standard AC electrical power as well battery sources and an attached solar panel. Further, the inner surface of the walls along with the tray is coated by spraying special advanced formulations which are unique to obtain special effects simultaneously and synergistically by in-situ synthesized polymeric three dimensional network consisting of nano to submicron to micron sizes moieties which are hybrid by stoichiometry composition comprising of various substrate species material capable of imposing and exhibiting bactericidal and antiviral activity simultaneously and synergistically .

CSIR-AMPRI, Bhopal has filed the Indian Patent Application No. 0129NF2020 and transferred the technology to M/S Apte medical system, Pune.

The above hybrid equipment with its unique characterization wherein simultaneously and

synergistically various components plays a very important role for the sanitization purpose and keeping the things free from germs/microbes including bacteria, viruses etc. and there by saving the society to get contaminated from severe diseased caused due to the harmful microbes.

Annexure C5

Awareness on COVID - 19

- A ZOOM Meeting was organised on April 8, 2020 in the leadership of Director of CSIR – AMPRI under CSIR-Jigyasa programme, in which 265 Principals of 152 Kendriya Vidyalaya schools of Bhopal, Jabalpur and Raipur regions and 113 Jawahar NavodayaSchools (Madhya Pradesh, Chhattisgarh and Odisha State) covered under NavodayaVidyalay Samiti Bhopal regions
- Dr.Avanish Kumar Srivastava, Director, CSIR-AMPRI, Bhopal delivered a talkon "Prevention and Fight against **Coronavirus - A virus which is spreading fast globally and causing COVID -19 disease**".

एम्प्री ने जिज्ञासा समाधान से खोला कोरोना के खिलाफ मोर्चा

Scientists hold Covid awareness talks with KV school principals

Bhopal: A meeting of 152 Kendriya Vidyalaya school principals of Bhopal, Jabalpur and Raipur regions and 113 principals of Jawahar Navodaya Schools (MP, Chhattisgarh and Odisha) along with regional offices, deputy commissioners, assistant commissioners and CSIR-AMPRI scientists was held with an objective to discuss scientific measures to prevent coronavirus infection among students, through their teachers and officers.

The Zoom meeting was initiated by CSIR-Advanced Materials and Processes Research Institute, Bhopal, under the CSIR-Jigyasa programme. On this occasion, Dr Avanish Kumar Srivastava, director, CSIR-AMPRI, talked about ways to prevent and fight against coronavirus.

The five verticals (to coordinate various research activities into drugs, vaccine, testing, sanitisers and hospital equipment), suggested by DG-CSIR to fight COVID-19, were also discussed.

Somit Kumar Srivastava, deputy commissioner, Bhopal Regional Office of Kendriya Vidyalaya Sangathan, Tajuddin Shaik, deputy commissioner, Jabalpur Regional Office, also presented their views.

CSIR-AMPRI in Bhopal is the only laboratory of the CSIR which is located in the states of Madhya Pradesh and Chhattisgarh. The Institute is making efforts to create awareness among 50 villages in Madhya Pradesh and Chhattisgarh about coronavirus. In the first phase, the institute is targeting villages of Bhopal and Sehore districts. TNN

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April 13, 2020
April 24, 2020
May 11, 2020

Annexure C6

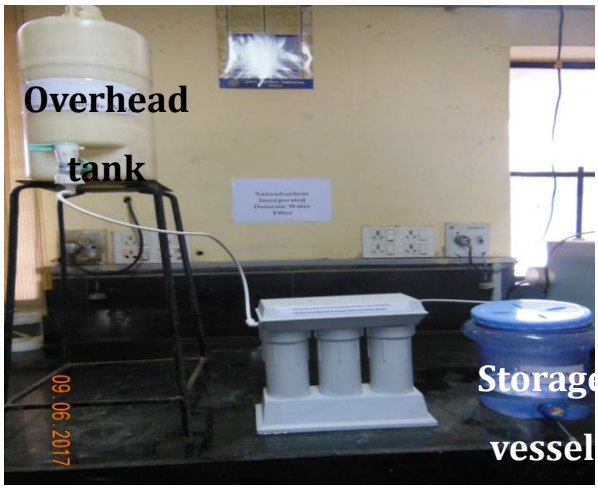
“Nano Alumina Adsorbent Based Water Filter for Arsenic and Fluoride Removal”

Long term drinking of water containing excessive fluoride(>1.5 mg/l) cause fluorosis problems to human being that affects teeth, bones, joints and ultimately leads to crippling of the body. Similarly drinking of excessive, arsenic (> 10 µg/l) contaminated water causes Arsenicosis problem that affect skin and ultimately leads cancerous problem. Due to contamination of ground water more than seventy millions people in nineteen states in India are suffering from fluorosis problem. Similarly more than twenty millions people in seven states in India are suffering from the Arsenicosis problem. Though numbers of technologies are

developed for the arsenic and fluoride removal of water but none of found suitable for providing safe drinking water particularly at household level. Present developed technology is easily understandable, cost effective and easy for operation.

The developed filter works under gravity. So no electricity require for the treatment of water. The filtration rate of the water depends on the height of overhead tank from where water comes in to the filter. pH range 6.5 -8.5 and total dissolved solid within 500 mg/l of raw water is more suitable for obtaining maximum arsenic or fluoride removal efficiency of the developed filter. The developed filter can also remove toxic contaminants like chromium, lead etc of the contaminated water. Nanoadsorbent used in filter for arsenic or fluoride removal, is of low cast and can be synthesized in bulk without any

waste generation. There are no mineral losses as total dissolved solid of the treated water is almost same after treatment. Treated water follows the drinking water standard as per BIS.



Annexure C7

Makeshift Clinic at J. P. Hospital, Bhopal, Madhya Pradesh

Makeshift hospital / housing technology is a remarkable research development for immediate preparedness in event of pandemic outbreak / post disaster rehabilitation. The technology for ‘makeshift hospitals/housing’ can be utilized at large scale for erecting single or connected units of structures for setting up temporary hospitals, check-up camps and quarantine facility. The proposed structures can also be used for other purposes like pulse polio camps, blood

donations camps, flood and earthquake relief camps, temporary housing in event of other natural disasters.

The fabrication of the structure makes use of prefabricated steel portals having features like foldable, easily erectable, reusable, safe, serviceable, comfort to the occupants and cost-effectiveness. It can be optimized for space utilization, scalable and appealing aesthetics. The erection of structure makes use of semi-skilled manpower for erection and hence provides opportunities for employment generation.

The technology for makeshift hospital/clinic/housing has been developed jointly by CSIR-Central Building Research

Institute, Roorkee and CSIR-Advanced Materials and Processes Research Institute, Bhopal. Both the institutions have legacy of serving the nation through technological interventions for decades.

The technology was transferred on June 29, 2020 to Shri Narendra Singh Jaggi M/s J. T. & Services, Bhopal.

M. P. Council of Science and Technology, Bhopal has supported the demonstration of the makeshift clinic by identifying the place with the help of Health department, Govt. of Madhya Pradesh and funding the program. The makeshift clinic has been constructed and demonstrated at Government J. P. Hospital, Bhopal.