

## **CSIR-CSIO Achievements from April 2023 to Present**

CSIR-CSIO is a national premier R&D laboratory engaged in undertaking research, design, and development of intelligent scientific & industrial instruments in the area of Agrionics, Medical Devices, Optics, Photonics, Public safety, Computational Instrumentation, Calibration, and Certification.

### 1. **Technology Transfer/Name of Technology:** Pesticide Detection Kit [PESTi-KIT]

The kit is colorimetric in nature and provides both qualitative and quantitative information. For qualitative information, variation in color intensity appearing due to bio-chemical reaction compared to control is an indication for presence of pesticides. And for quantitative estimation, the kit is interfaced with a small reader.



#### **Social Impact of technology:**

The blasting population of India is resulting in higher food demand, hence to fulfil this need, the agriculture produce is often contaminated with chemical contaminants such as pesticides to increase the food yield in short period. Pesticides are one of such chemical contaminants which are extensively applied to the agriculture produce to increase the crop growth and quality. And at the same time, they are highly toxic for humans or livestock. Hence, due to their excessive use to get lucrative price for the food produce, the annual burden of pesticide/toxins borne diseases accounts for millions of deaths globally. Development of rapid, accurate, easy to-use and affordable testing methods could urge food quality analysts to actively screen food for contaminants and toxicants rather than relying on monitoring by conventional instruments. Availability of such rapid testing based devices will help create not only the quality assurance but will also help to screen produces enter living body.

#### **Economic Impact of technology:**

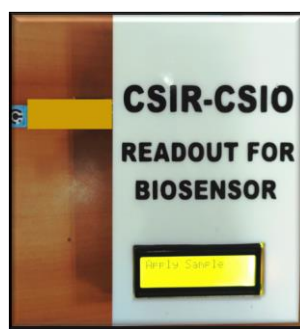
The technology is towards Make in India Initiative. Not too many manufacturers for such kits, hence most of the kits are either imported or testing is done with laboratory restricted sophisticated instruments which are not only costly but also require skilled technical manpower to operate them. Such point of site devices/kits can help in initial screening, thus warning the processors or consumers before sending the samples for costly testing. Further, the global pesticide detection

market expects a CAGR of 7.4 % due to growing demand and is likely to reach 3,763.3 Million \$ by 2032.

**Patents granted/filled:** 2 Nos.

2. **Technology Transfer/Name of Technology:** Point of site device for cardiac biomarker estimation [HeartChk]

The product is a portable/handheld electrochemical device and comes with ready to used functionalized immuno-electrodes. Such portable device finds immense importance in case of emergency patients where it is critical to decide treatment prognosis based on the troponin I levels. Troponin I detection can aid doctors to rule out or to find the heart attack.



**Social Impact of technology:**

Availability of such point of care testing (POCT) devices or diagnostic tools can rapidly be used to decide the treatment prognosis and immediately start it. This ability could help hospitals with more rapid triage and management of those diagnosed with a heart attack, as well as being able to safely discharge the patients after their routine treatment.

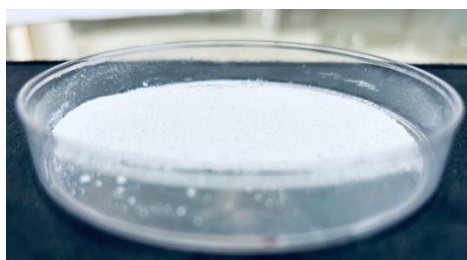
**Economic Impact of technology:**

This technology is point of care diagnostic device and is a contribution towards indigenous technology development. Most of the available testing kits are imported and costly. Further, as per Data Bridge Market Research, the global cardiac markers rapid tests and point of care (POC) market is expected to reach USD 1303 million by 2030, and is expected to undergo a CAGR of 13.6% during the forecast period of 2023 to 2030.

**Patents granted/filled:** 1 Nos.

3. **Technology Transfer/Name of Technology:** Process for synthesis of crystalline *nano*-hydroxyapatite

*nano*-HA finds application not only in biomedical domain e.g bone filler for orthopedic surgeries, desensitizer, drug delivery, scaffolds, etc but is also highly desirable for applications like as air filter, catalysis, etc. Being low cost material, its application can further be expended for commercialisation.



**Social Impact of technology:**

Most commonly HA is used for dental applications and for coating of orthopedic implants. Implant manufacturers are getting these coating done from International market. Availability of such material in Indian market along with optimised coating technique can help in reduction of overall cost of implants which inturn will bear social cause for needy and poor patients.

**Economic Impact of technology:**

Hydroxyapatite (HA) demand has its driving force from increased old age population, subsequent increase in bone transplants, bone grafting, advancements in research thus increasing the application demand of HA, etc. Consequently, the HA market is expected to be about \$3.65 million by 2027 and is segmented based on application, region and type. Key market players are mostly foreign companies.

**Patents granted/filled:** Nil

4. **Technology Transfer/Name of Technology:**

Modular system and method for the fabrication of paper microfluidic analytical devices.

**Technology Transfer:** No

**Economic Impact of technology:** a fabrication assistant for conducting paper-based microfluidic assays for biomedical diagnostics, environmental monitoring, food quality control and related products

**Patents granted/filled:** 1 No.

5. **Technology Transfer/Name of Technology:** Detection driven on-demand drug release system

**Technology Transfer:** No

**Social Impact of technology:** a device for monitoring and controlling the dihydrotestosterone (DHT) levels, which constitutes an important biomarker for prostate cancer and androgenic alopecia.

**Economic Impact of technology:**

**Patents granted/filled:** 1 No.

6. **Technology Transfer/Name of Technology:** Magnetically controllable hydrogels for drug release and method, thereof.

**Technology Transfer:** No

**Social Impact of technology:** a device and method for magnetic field stimulated drug release from drug loaded magnetic hydrogel. The quantity of drug release from the drug loaded magnetic hydrogel can be controlled by externally varying magnetic field strength. Further, the invention supports a wide possibility of application scenarios for biomedical, biotechnology and pharmaceutical, and related development of drug delivery products.

**Economic Impact of technology:**

**Patents granted/filled:** 1 No.

7. **Technology Transfer**

Intelligent Seismic Sensing System for Elephant Movement Detection (*eleSeisAlert*)

**Social Impact of technology**

Intelligent Seismic Sensing Node (*eleSeisAlert*) is a customizable intelligent system which is capable of interfacing with an array of seismic sensors for detecting and classifying any ground vibration generated due to movements of animals, humans etc. This system can be adapted for a wide range of ground sensing applications—wildlife monitoring for elephant-rail accidents, perimeter monitoring.

Application areas are given below:

- Detection of movement of wild animals along linear infrastructures (railway lines, roads etc)
- Protection of agricultural crop lands from animals.

**Economic Impact of technology**

The development of linear infrastructures at India to the meet the economic growth of a nation is exponentially increasing. Specifically, the Indian Railway network has rapidly expanded and modernized during the last few decades. Humans have always kept expanding the boundaries of its civilization and more so with the technological advancements and accretive human population. In doing so, there have been increasing incidences of human-animal confrontations, which maybe direct or indirect. Railway lines cuts through bio-diversity rich areas in the northern part of India in Uttarakhand and Jharkhand states; north-eastern railway through West Bengal and Assam; south-eastern railway in Odisha; and southern railway lines in Kerala and Tamil Nadu.

Rail-elephant accidents have significant impact on the economy, social lives and biodiversity. Any such accidents not only cause the disruption of the functioning

of railway network, but also counts to a huge economic loss due to delay in transportation of goods for commercial activities. Also, there is a high chance that the onboard commuters may be injured and also need several medical assistance and further compensations. On an average twenty elephants die every year due to rail induced elephant accidents.

### **Patents granted**

Patent No: 1006266, Method and system for activity recording, visualisation and analysis for identified segments of forest, Country, Bangladesh

YouTube:

[https://www.youtube.com/watch?v=WvYr0Zmx2A4&t=207s&ab\\_channel=IndiaScience](https://www.youtube.com/watch?v=WvYr0Zmx2A4&t=207s&ab_channel=IndiaScience)