

Non-Invasive Point-of-Care Sensors for Monitoring Physiological Parameters from Bio-Analytes in Perspiration and Soil Nutrition

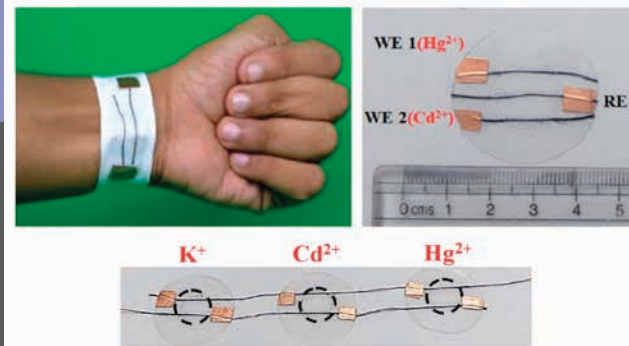
Problem Statement: Affordable and high-performing sensing platforms have become increasingly critical for sustainable environmental monitoring and medical diagnostics. Designing scalable and robust sensors poses an escalating demand in a rapidly automated society. A major challenge in realising such sensors is their operational reliability and reproducibility under widely varying conditions. Thus, developing an affordable and scalable sensing platform to detect important analytes in harsh environments reliably has been an enduring unmet challenge.

Uniqueness of the Solution: The current technology presents a scalable approach to achieve reliable, ultrasensitive detection of cations in harsh environments relating to physiological, water-quality monitoring and soil-nutrient assessment. The sensor exhibits identical performance under standardised laboratory conditions and real-time samples such as body fluids (sweat) and turbid water (lake). Both

these applications involve very specific detection of K^+ , Cd^{2+} , Zn^{2+} and Hg^{2+} in ppb levels in the presence of a large excess (1000 times) of potential interferences (Na, K, Cu, N, Cl) and particulate matter that blocks and deactivates the sensing surface.

Current Status of Technology: The technology testing in both lab-scale and field-testing has been carried out. Similarly, a wide variety of soils from various parts of Maharashtra have been evaluated to assess micro-and macro-nutrients. Water samples from Powai lake are tested with the sensors, consisting of a reusable or use-and-throw patch (cost of < INR 5/patch). The technology for industrial adoption and validation is solicited.

Societal Impact: Point-of-care diagnostics is a rapidly emerging market in India with specific societal importance in the medical and agricultural sectors. This technology stands out in the



market because of its superior reliability, particularly under harsh field conditions, greater sensitivity without affecting the quantifiable outputs, low-cost making, and being suitable for scalable production.

Patent(s): Nil

Relevant Industries: Sensors, Agriculture, Healthcare, Environment.

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