



TECH OFFER

AUTOMATED IONS MONITORING SYSTEM



KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics – Sensors & Instrumentation
Infocomm – Internet of Things
AgriTech/MedTech – Ions Sensing Platform

TECHNOLOGY READINESS LEVEL: TRL 5

COUNTRY: SINGAPORE

ID NUMBER: MT-ISP-001

Patents: Fluid transfer system and method of forming the same, Singapore, PCT/SG2020/050646, 2020.

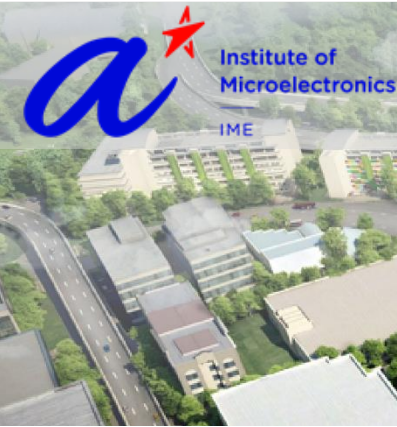
Know-How: A method to improve the stability of the ion-selective membrane integrated sensor, IME Know How PAT19-072/SIP-017, 2022

Publication: Solid-State Ion-Selective pH Sensor, IEEE Sensors Journal, Vol.22, No.12, June 15, 2022.

OVERVIEW

The current nutrient sensors commonly used in hydroponics agriculture combine pH and electrical conductivity sensor to provide an overall nutrient concentration measurement. This approach is unable to measure individual ion concentrations. Hence, farmers often resort to laborious procedures of extracting nutrient solutions and sending the samples to specialize laboratories for ion analysis. This procedure is time-consuming, expensive, and does not offer immediate results.

Our ion sensor with automated calibration function enabled a high sensing accuracy. In addition, the sensor can measure multiple ions simultaneously and generating the result on the spot. This enables farmers to make data-driven decisions and optimize hydroponics pool's nutrient concentration promptly, revolutionizing hydroponics agriculture for a more sustainable future.



TECHNOLOGY FEATURES & SPECIFICATIONS

The technology consists of an ion sensor combine with in-house calibration protocol for accuracy enhancement. The proof-of-concept prototype was tested with nutrient solution collected from actual hydroponics setup. The results were further validated using commercial Spectro-based equipment.

- The solution can be used for **multiple ion concentration monitoring** (NO_3^- , K^+ , Ca^{2+})
- A **detection range** of **1mM to 100mM** for hydroponics system monitoring
- The device is capable of **self-calibration** for **accuracy enhancement (>85%)**
- The solution enabled **on-site measurement with a rapid result (<10 minutes)**
- The device can be **wirelessly operated** with smartphone

POTENTIAL APPLICATIONS

The applications include but are not limited to:

- Agriculture nutrient management
- Wastewater monitoring
- Drinking water monitoring
- Non-invasive sweat sensor

UNIQUE VALUE PROPOSITION

- The miniaturized sensor package making it possible to customize for **on-site applications**.
- The device can reach a **high level of accuracy**.
- The device can be configured to **sense multiple ions concurrently**.
- Compared to using laboratory equipment, this setup is **more affordable** and provide a **faster test turn-around time**.
- The **self-calibration** ion sensor minimises the sensor error from potential sensor drifting.
- The sensor can be **customized for different ions detection**.