

# Biosensor Platform Technology for Ion Concentration Measurement

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⇒ A small, cheap real-time ion concentration measuring sensor platform with a disposable ion reaction channel and a structure for differential/single detection and amplification/offset compensation

### Client / Market

- Sensor and measurement device-related company in the medical, bio field (products requiring a cheap, small ion concentration measurement device)
- Soil, water, food, beverage quality management-related company
- Environment monitoring company for chemical product, oil and gas, waste and water treatment facility

### Necessity of this Technology

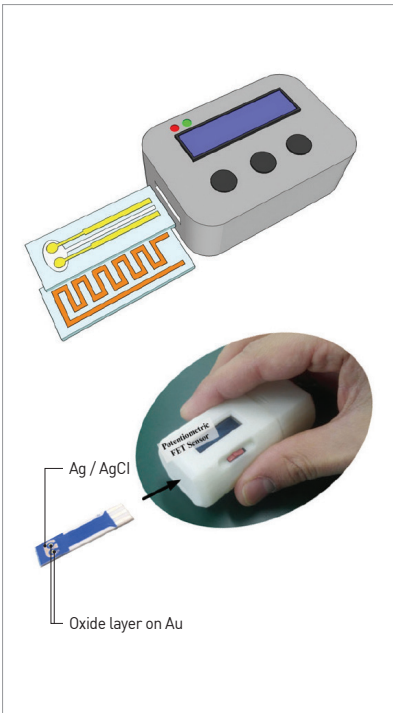
- Existing semiconductor-based ion concentration detection device uses an expensive sensor and has limits regarding its application for a disposable device.
- Offset that occur while acquiring electrochemical reaction voltage lowers the accuracy of the detection and reduces the dynamic range available for detection.
- Need a low-price semiconductor-based sensor platform with a separate reaction channel and a readout circuit for a one-time use
- Need a method to effectively acquire differential signals to detect the real-time change in the ion concentration
- Need a technology to automatically compensate for offset and adjust the amplification level

### Technical Differentiation

- With a separated reaction channel from the readout circuit, it is possible to use for disposable device.
- Multiple independent transistors enhance the sensitivity in the detection of the membrane potential.
- Can detect minute motion and change of ions and within a space with a specific amount of ions
- Can selectively detect the differential/single signal
- Offset it automatically compensated while detecting the differential signal to enhance accuracy and expand the dynamic range.
- Can enhance sensitivity by adjusting the amplification level of the differential signal

### Excellence of Technology

- Improved the dynamic range available for detection by 22.5 dB (=20 log[Vw/comp/Vw/o comp]) using the automatic offset compensating feedback structure



### DESIRED PARTNERSHIP

Technology Transfer

Licensing

Joint Research

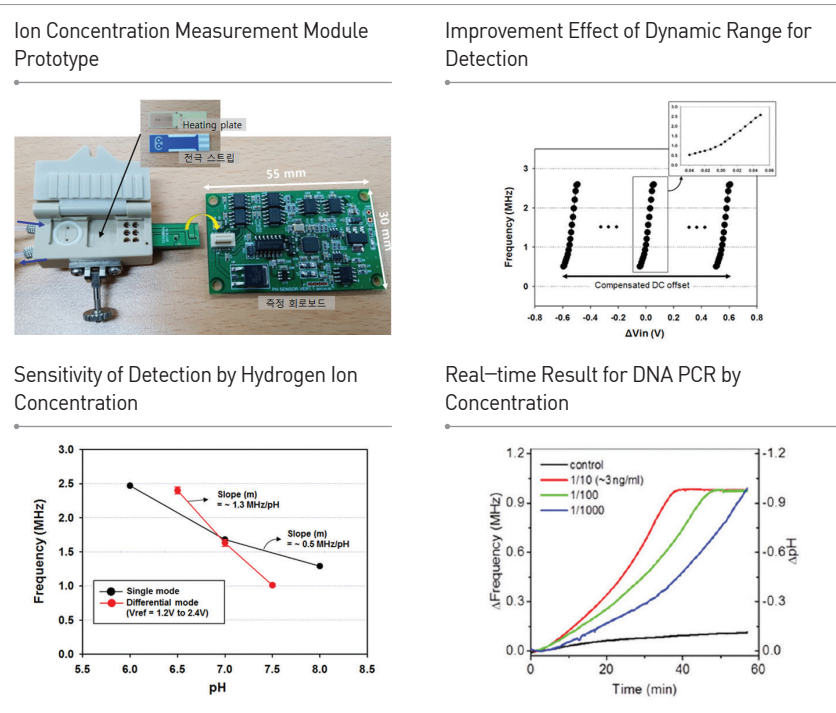
Other



### TECHNOLOGY READINESS LEVEL [TRL]

- Research, basic explanation
- Project concept or idea development
- Technology idea verification
- Prototype development
- Trial product production/evaluation in similar environment
- Pilot field demonstration
- Development and optimization of commercial model
- Commercial product demonstration
- Mass production and initial market launch

- The single and differential signal excellently detects target by ion concentration; Especially for the differential mode, by the offset automatic compensation, the same result is obtained regardless of the fluctuation of the reference voltage (1.2 V to 2.4 V).
- The first small module to achieve detection by concentration in the DNA PCR (polymerase chain reaction) experiment



### Current Intellectual Property Right Status

#### PATENT

- Method and Apparatus for Detecting Ion Concentration (KR1729685, US14/959, 001)
- Differential Amplifier with Offset Correction Ability and Driving Method of the Same (KR2018-0018123)

#### KNOW-HOW

- Analog circuit design and module fabrication for electrical differential signal detection
- Real-time feedback control technology with automatic offset compensation
- Reactive electrode fabrication for ion detection
- Small device fabrication technology for point-of-care