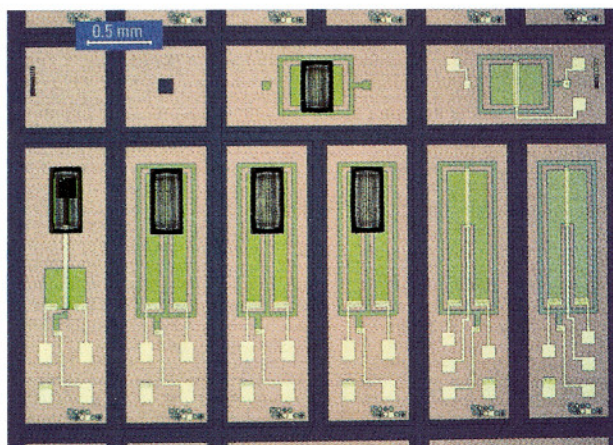




M I C R O S E N S

Sensor Description

Ion Sensitive Field Effect Transistor - ISFET



Integrated Electrochemical Ion Sensors, ISFET devices on 4" silicon wafers

■ The ISFET is a miniature Ion sensor manufactured using a standard CMOS microelectronic technology. This device is leading to a whole range of integrated electrochemical sensors.

■ The ISFET measurement principle is based on the Field Effect induced by ions across an insulated film acting as a capacitor.

■ The device operates like a classical MOSFET where the metal gate electrode is replaced by a reference electrode and the measured electrolyte solution. Adsorbed ions on the insulated gate modify the electronic current between the source and drain in the p-type silicon channel of the transistor.

■ Al_2O_3 and Si_3N_4 -insulating gate ISFET have been developed for pH-measurements in various solutions.

■ Organic ion selective membranes are photopolymerized on the solid-state insulating gate for the selective measurement of K^+ , Ca^{2+} , Mg^{2+} and other ion concentrations. (PATENT No 683874, EP No 91810775).

Main advantages

- All solid state
- Small size
- Wide temperature operations
- Low cost
- Long term stability
- Easy calibration

■ Realized with a standard microelectronic technology, the ISFET have the advantage of being produced in series, by batch manufacturing processes reducing the cost with the quantities and insuring a high reproducibility of their characteristics.

■ Relying on their very small dimensions, the ISFET devices are possibly measuring the pH or ion

concentration in very small liquid volumes.

■ With different packaging geometries, the devices can be used either in a dipping procedure or in a flow through cell system.

■ A multi-ion sensor can be realized with the same technology keeping the reduced dimensions.



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General specifications

Sensitivity:	50 mV/pH unit 58 mV/pK ⁺ 30 mV/p Ca ²⁺
Accuracy:	0.01 pH (or 0.1%)
Stability:	better than 0.1 pH/day (or 1%)

Applications

Chemical Analysis Laboratories

- Flow injection analysis (pH, K⁺, Ca²⁺ and other ions)
- Portable pH measurement instruments (pH-pen)
- Automatic chemical analysis

Industry

- Process control
- Food industry quality control
- Water quality monitoring

Environment

- Waste water control
- Drinking water quality
- Portable systems for field measurements

Medical

- Gastroenterological pH-measurements
- "in vivo" non-invasive diagnostics
- "ex vivo" blood physiological parameters measurements and monitoring
- Control microsystems for dialysis

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