



Just One Sensor for Pressure, Gas, and Temperature: A team led by researchers from Seoul National University will discuss a smart multimodal device they developed that integrates gas, barometric pressure, and temperature sensing with energy-efficient in-memory computing-based processing on a single, compact substrate. By utilizing an in-memory computed capacitive binarized neural network, the sensor consistently delivers high-precision gas detection with 97.8% accuracy, even under varying conditions. It also offers highly linear and sensitive barometric pressure readings and robust gas identification capabilities in real-world environments, with great potential for precise environmental monitoring and safety applications.

The top image above is a schematic of the proposed intelligent multimodal sensor, integrating multi-sensing and processing capabilities.

The lower group of images are:

- (a) a schematic diagram of the integrated barometric pressure sensor array and AND-type NVM array.
- (b) a SEM image of the barometric pressure sensing system.
- (c) a SEM image of a sensor with a P1 piezo-resistor and Type 1 air pocket.
- (d) a SEM image of a sensor with a P2 piezo-resistor and Type 2 air pocket.
- (e) a SEM image of the NVM array.

(Paper #18.7, “Intelligent Multimodal Sensors Integrating Gas, Barometric Pressure, and Temperature Sensing,” G. Jung et al, Seoul National University/Ministry of Science and ICT)