

Nondispersive Infrared Ray CH₄ Gas Sensor Using Focused Infrared Beam Structures

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We propose a concave optical cavity structure for use in a high-performance nondispersive infrared ray (NDIR) methane gas sensor module. By using a concave mirror structure, the maximum output voltage and voltage difference between 0 and 9,500 ppm increased by more than 160% compared with using a vertical mirror structure. The output voltage dependence of the thermopile location was tested in the case of a concave mirror structure. The output voltage increased from 2.75 to 3.63 V with the thermopile detector placed at distances of 2 and 3 mm from the reference position. It was found that the output voltage of the sensor decreased by more than 45% from 2.16 to 1.18 V after three years of operation in the case of the vertical mirror structure.

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