

## **"Low Voltage CO<sub>2</sub>-Gas Sensor Based on III–V Mid-IR Immersion Lens Diode Optopairs: Where we Are and How Far we Can Go?"**

Sotnikova, G. Y.; Gavrilov, G. A.; Aleksandrov, S. E.; Kapralov, A. A.;  
Karandashev, S. A.; Matveev, B. A.; Remenny, M. A.

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*Abstract* — The study presents a comparative analysis of parameters of infrared radiation source and detector hardware that are most important for the creation of portable optical nondispersive infrared (NDIR) gas sensors. An analytical model of the optical gas sensor is proposed. The notions of an instrument and transfer functions of the sensor as a measurement device are introduced. Capabilities of the model have been demonstrated by the example of carbon dioxide sensor based on immersion diode optopairs. Validity of the model is proved by good coincidence of calculated and experimental data. Analytical description of the transfer function of a NDIR carbon dioxide sensor allowed us to carry out the comparative analysis of potential sensitivity of sensors based on different hardware produced by basic fabricators of IR components.