Performance analysis of diode optopair gas sensors

Galina Yu.Sotnikova*, Sergey E.Aleksandrov and Gennadyi A.Gavrilov

Ioffe Institute of the Russian Academy of Sciences, 26 Politekhnicheskaya Str., St.Petersburg, 194021 Russia

ABSTRACT

Analytical description of the transfer function of an optical gas sensor takes into account a fine structure of gas absorption spectra and spectral characteristics of optopair elements and their temperature drift. Such approach permits one to estimate as early as at the designing stage the expected accuracy of measurements that can be provided by nondispersive infrared (NDIR) gas sensors of different configuration as the environment temperature changes and/or in the presence of interference from foreign gases. Moreover, analytical description of the transfer function allows increasing the accuracy of gas concentration measurements. Calculated and experimental results of the study of laboratory models of small-size NDIR sensors based on mid-infrared (3-5 μm) immersion diode optopairs are given. The presented results confirm the validity of the proposed approach for the NDIR gas sensor description and promising prospects for using the sensors based on immersion diode optopairs in portable gas analysers.

Keywords: NDIR gas sensor, immersion lens diode optopair, sensor instrument function, gas sensor transfer function.

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* Send correspondence to Galina Yu. Sotnikova: E-mail: gga_holo@mail.ru