A gas sensor based on bismuth ferrite obtained by glycine-nitrate combustion

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The production of bismuth orthoferrite by glycine-nitrate combustion is an effective way of synthesizing this material. The advantages of this method are: the possibility of controlling the stoichiometry of the compound and also obtaining nanocrystalline $BiFeO_3$ with a particle size of less than 30 nm. It is planned to take mixtures with a ratio of glycine and nitrates 1.5–3.5. The subsequent heat treatment of the resulting powder should be carried out at a temperature (450, 500 or 550 °C) for 2 hours. Due to its good thermal stability and high sensitivity to acetone, $BiFeO_3$ particles can be used as effective sensors. In a sensor with $BiFeO_3$ as a sensor material, a change in conductivity is recorded upon contact with the gas being detected, so that the gas concentration can be quickly determined. It is planned to perform a series of experiments with various mixtures of gases. The sensor will also be tested in conditions of high humidity (using a thermostat) at different temperatures. The optimal composition of the sensor substance based on bismuth ferrite, as well as the optimal size of crystallites and particles, will be selected. The design and materials will be made in such a way as to avoid various effects that can reduce or completely block the signal coming from the sensor (for example, the percolation effect). It is worth noting that in a series of experiments, it is also planned to fully study the cyclic volt-ampere characteristic, which will not only selectively determine one particular gas, but also distinguish other gases present in the analyzed sample.