

S5-034

Sensor Based on Semiconductor Nanostructures for Polycyclic Aromatic Hydrocarbons Detection in Water Objects

Olga A. Sushko, Mykola M. Rozhitskii

Laboratory of Analytical Optochemotronics, Kharkiv National University of Radio Electronics

14, Lenin ave., Kharkiv, 61166, Ukraine

e-mail: rzh@kture.kharkov.ua

Every year in the world's water basins fall thousands of chemicals with unpredictable effects, many of them are hazardous for human being among which are polycyclic aromatic hydrocarbons (PAHs). That is why their detection and content monitoring are quite important

Modern methods and means for the determination of PAH have several disadvantages such as high detection limit, low selectivity, long duration and complexity of the analysis procedure. The work sensor based on semiconductor nanostructures avoiding of these disadvantages is described.

The proposed nanophotonic sensor device contains an optically transparent working electrode modified by a thin layer of semiconductor nanomaterials like quantum dots (QDs) that play a role of detector elements for PAHs determination. QDs are luminophores but in comparison with organic luminophores they have a much narrower luminescence spectra, high luminescence intensity and quantum yield, stability for photobleaching. QDs converted to ionic form in electrochemical processes on working electrode react with oppositely charged analyte particles (PAHs) formed on sensor's auxiliary electrode, resulting in emission of an analytical signal from excited QD light quanta $h\nu$ the number of which is a measure of PAHs content. The peculiarities of the developed sensor and analytical system as a whole if compared with known one are high selectivity, reproducibility, simplicity and cheapness of construction.

The developed sensor contains the follow elements: sample inlet, working ITO electrode, substrate, auxiliary glassy carbon electrode, laying, connector for connection the working electrode, hole for connection the auxiliary electrode, working chamber, layer of luminescent QDs detector elements, sample outlet.

The developed sensor operation was tested on a model solutions contained such widespread and dangerous PAH as benzo[a]pyrene. The obtained data show good metrological characteristics (a low detection limit, high reproducibility and some others).