

# ZnO THIN FILMS AS A PLATFORM FOR OPTICAL IMMUNOSENSORS DEVOTED FOR DETERMINATION OF GVA-ANTIGEN

**A. Tereshchenko<sup>1</sup>, V. Fedorenko<sup>1,2</sup>, V. Smyntyna<sup>1</sup>, I. Konup<sup>3</sup>, A. Konup<sup>4</sup>, M. Eriksson<sup>5</sup>, R. Yakimova<sup>5</sup>, A. Ramanavicius<sup>6</sup>, S. Balme<sup>2</sup>, M. Bechelany<sup>2</sup>**

<sup>1</sup> Faculty of Physics, Experimental Physics Department, Odessa National I. I. Mechnikov University, 42, Pastera, 65026, Odesa, Ukraine, [alla\\_teresc@onu.edu.ua](mailto:alla_teresc@onu.edu.ua)

<sup>2</sup> Institut Européen des Membranes IEMM, ENSCM UM CNRS UMR5635, Place Eugène Bataillon, F-34095 Montpellier Cedex 5, France

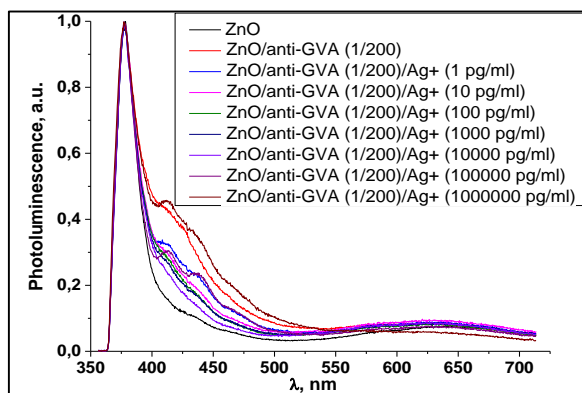
<sup>3</sup> Department of Microbiology, Virology and Biotechnology, Odessa National I. I. Mechnikov University, 2, Shampanskiy lane, 65000, Odesa, Ukraine

<sup>4</sup> National Scientific Centre "Institute of Viticulture and Wine Making Named After V. Ye. Tairov", 27, 40 Let Pobedy str., 65496, Odesa, Ukraine

<sup>5</sup> Department of Physics, Chemistry and Biology, Linköping University, 58183 Linköping, Sweden

<sup>6</sup> Department of Physical Chemistry, Vilnius University, Naugarduko str. 24, LT-03225 Vilnius, Lithuania

Optical immunosensor for the determination of *Grapevine virus A-type* (GVA) proteins (GVA-antigens) has been developed [1]. The immunosensor was based on thin films of ZnO (100 nm thickness) formed by atomic layer deposition (ALD). The ZnO-based films have demonstrated good surface-structural properties for the absorption of antibodies (anti-GVA) against GVA-antigens in order to form a biosensitive layer. The absorption of anti-GVA antibodies resulted in new photoluminescence band appearance in the region of 400-550 nm that can be caused by the formation of some chemical bounds during the anti-GVA adsorption on ZnO surface [2]. The possibility to detect GVA-antigens without additional labels (e.g enzymes or fluorescent dyes) has been demonstrated. The GVA-antigen detection was performed by the evaluation of changes and behavior of the photoluminescence band, related to protein adsorption (Fig. 1). The sensitivity of as-formed label-free biosensor towards the GVA-antigens was determined in the range from 1 pg/ml to 10 ng/ml; in addition, the selectivity of biosensor was evaluated (Fig. 1).



**Fig.1.** PL spectra dependence (normalized intensity) of ZnO<sub>100nm</sub>/anti-GVA-based immunosensor under different GVA-antigen concentrations

## References

1. A. Tereshchenko, V. Fedorenko, V. Smyntyna, I. Konup, A. Konup, M. Eriksson, R. Yakimova, A. Ramanavicius, S. Balme, M. Bechelany, Biosensors and Bioelectronics, Accepted Manuscript, DOI: <http://dx.doi.org/10.1016/j.bios.2016.09.071>.
2. A. Ramanavicius, V. Karabanovas, A. Ramanaviciene, R. Rotomskis, Journal of Nanoscience and Nanotechnology, Volume 9, Number 3, March 2009, pp. 1909-1915 (7).