INVESTIGATION OF PLANAR AND NANOSTRUCTURED ZnO AND Al_2O_3 APPLICATION IN BIOSERSORS DESIGN

Vincentas Mindaugas Mačiulis[1], Ieva Plikusiene[1, 2], Almira Ramanaviciene[2], Anton Popov[2], Octavio Graniel[3], Mikchael Bechelany[3], Arunas Ramanavicius[1, 2]

[1]Laboratory of Nanotechnology, State Research Institute Centre for Physical Sciences and Technology, Sauletekio ave. 3, Vilnius, Lithuania

[2]Institute of Chemistry, Faculty of Chemistry and Geosciences, Vilnius University, Naugarduko 24, Vilnius Lithuania;

[3]Institut Européen des Membranes , CNRS, France

vincentas.maciulis@ftmc.lt

In the past decade, the attention of researchers has been given to the design of new nanoscale materials with advanced properties. ZnO is known as an n-type semiconductor with good transparency, high electron mobility, wide band gap of 3.37 eV, high exciton binding energy of 60 meV, and strong luminescence at room temperature. Because of high photosensitivity, chemical stability, and nontoxicity, ZnO is a perspective material for application in UV, gas, and biological sensors [1].

Aluminum oxides exhibit such properties as biocompatibility. If Al_2O_3 is oxidised the self-organised honeycomb structure of similar diameter nanopores, which run parallel from the surface to the base of the substrate can be formed. [2]. Surface modification of this sort could lead to protein molecules being absorbed into the pAAO film nanopores.

The aim of this work was to investigate possibilities of nanostructured ZnO and Al_2O_3 application in biosensors design. The differences of binding kinetics onto planar and nanostructured ZnO layers and Al_2O_3 were obtained using spectroscopic ellipsometry (SE) method and will be presented.

Real time monitoring of proteins interaction are very important issue because information about reaction mechanisms can be evaluated. For this purpose optical methods, which are able to acquire real time measurement of molecules interaction, are contactless and do not need labeling are very suitable. In this case SE is suitable measurement technique not only because it provides earlier mentioned properties but also of ability to measure two parameters simultaneously [3].

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[3] Balevicius et al., "In situ study of ligand-receptor interaction by total internal reflection ellipsometry", 571, 744-748, Thin solid films (2014)