MODIFICATION OF METAL OXIDE SURFACES WITH REGENERABLE PHOSPHOLIPID BILAYERS FOR THE DEVELOPMENT OF REUSABLE BIOSENSORS

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Recently, studies related to tethered phospholipid membranes (tBLM's) formed on electrically conductive surfaces modified with self-assembled monolayers (SAM's), have attracted increasing interest. The main application of such systems is the development of biosensors. Typically, biosensors are developed on gold surfaces, although they have poor membrane regeneration properties and are expensive. As a cheaper alternative to gold substrates, metal oxide surfaces might be used because of the possibility of membrane regeneration.

In this work we formed tBLM's of various compositions on a fluorine doped tin oxide (FTO) surface chemically modified with several silane group compounds and investigated the interaction between membranes and proteins, and conditions for regeneration after the protein incorporation into a membrane. As phospholipids are readily soluble in many kinds of alcoholic solvents, while proteins are not, the main goal of this work was to specify the optimal conditions for the removal of the phospholipid membrane and the protein from the surface. After properly removing the protein-affected phospholipid bilayer, the FTO surface should stay modified with SAM and could be used for the repeatable membrane formation. The work investigates how the efficiency of membrane regeneration depends on the composition of the SAM and the phospholipid membrane.