IMMOBILIZATION OF BIOLOGICAL ELEMENT ON AN OPTICAL DEVISE BUILT WITH SPIROYRAN

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Introduction. Exist many biosensors built with material help to immobilized biological elements [1], spiropyran is a photochromic material used in amperometric transducer [2], it had been electrosattached to different enzymes [3], and in this work we used these spiropyran characteristics to immobilized glucose oxidase on an optical device, the characterization was performed by infrared (ATR mode) and UV/Vis spectroscopy, Atomic Force (AFM) and Scanning Electron microscopy (SEM).

Methods. Corning of quartz was used as matrix, clean solution (1:1 MeOH:HCl, H_2SO_4) was used to prepared the matrix [4], 1% silane solution was prepared to functionalized the surface [5], and a solution prepared with spiropyran ($C_{19}H_{18}N_2O_3$), EDC ($C_5H_{11}N{=}C{=}NC_6H_{11}$), NHS ($C_4H_5NO_3$), HEPES ($C_8H_{18}N_2O_4S$) and glucose oxidase from *Aspergillus niger* was the last step to immobilized this enzyme.

Results. The results obtained show the device characterization, we follow 3 steps to build it, the first step was cleaned the matrix, the next step was functionalized the surface with silane material, this step allows to modified the surfaces, to prepared to attach the spiropyran. The bonds found from the FTIR spectra to silanized step and the functionalized step (spiropyran attached) are show in table 1.

Table 1. .Characteristics bonds from silanize and functionalized process.

Bound	FTIR region (cm^{-1})	
Si-Si	780	Silane
Si-O	950	Silane
C-N	1271, 1301	Spiropyran
N-O	1333, 1520	Spiropyran
CH_3	139, 1470	Spiropyran
AROMATIC RING	1576, 1609	Spiropyran
C=C	1649	Spiropyran

The spectra show absorption changes, the silanized process spectrum present 2 characteristic peaks and the functionalized step present 9 characteristic peaks. The AFM micrographics for 3 steps have also surface roughness differences.

After built a device (optical transducer to detect optical absorption changes) the last step of this work was confirming the enzyme presence on the optical device surface. The figure 1 shows the surface of the optical device without (A) and with (B) glucose oxidase.

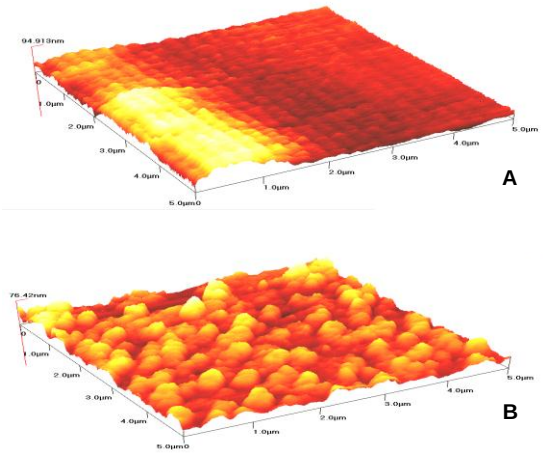

Fig.1 .AFM micrography of surface device modified with spiropyran (A) and with Glucose oxidase (B).

Conclusions. The result indicated that FTIR and AFM techniques are available to characterized and identify absorption, morphology of a devise modified with spiropyran, that allows attach some biological material, in this case glucose oxidase, the absorption changes and morphological changes are the evidence of immobilization successful.

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