Self assembled monolayer, as optical transducers, using spiropyran photochromic material

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The self assembled monolayers (SAM) have become in the most popular strategy for design and generate surfaces characterizing by specific functional organic groups. The aimed of this work is applied this SAM as optical transducer in biosensors. The techniques, Infrared (in ATR mode) and UV/Vis spectroscopy have been used to study the films generated in each step in the self assembled process. The SAM was generated as follow; first silane group was added to the glass substrate. After that, the substrates were immersed in a solution containing carbomiide group (EDC). Finally the spiropyran 1′,3′-Dihydro-8-methoxy-1′,3′,3′-trimethyl-6-nitrospiro[2H-1-benzopyran-2,2′-(2H)-indole] was attached to functionalized slides. In each process absorbance was analyzed by UV/Vis (270 to 500 nm) and FTIR (650 to 1800 cm-[1]). In UV, the spectra shows an absorbance band centered at 280 associated to EDC film and a lower intensity band centered at 380 nm associated to spiropyran. In FTIR spectra, the Si-Si and Si-O bond are present below the 1250 cm^{-1}. The EDC film shows very weak bands in the region from 1300 to 1800 cm^{-1}. For the spiropyran film the band associated to the C-N, N-O, C=C, C-H and aromatic ring have a very well defined peaks. Once the transducer bands were detected, it was immersed in glucose solution; the infrared spectral show bands are associated to glucose in the transducer.

Keywords: spiropyran, infrared spectroscopy, optical transducers, biosensor.

1. INTRODUCTION

Biosensors with optical transducers have different advantages such as remote sensing, low cost, can be miniaturized, free from electrical interference, etc. Chemical modification onto matrix surfaces has been a major growth area in to immobilization of a various biopolymers[1, 2]. Optical transducers with photochromic molecules have been studied in different devices[3, 4].

Spiropyran is a photochromic organic material which is formed by two heterocyclic units linked by a spiro carbon. The photochromism can be defined as a reversible transformation of chemical specie, induced in one or both directions by electromagnetic radiation; between these two states, exist light absorption in different regions of the spectrum. The photochromic transformation and the observed spectral changes are related to changes in physical or chemical behavior[3].

Spiropyran (SP) absorbs in the ultraviolet (UV) region (300-400 nm). Upon UV illumination, the (SP) colorless isomer undergoes heter=olytic cleavage of the CO bond to the form the colored isomer named merocyanine. The coloration

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