

## Structural Analysis of Spiropyran Polimers using ATR Spectroscopy

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**Abstract.** We have used infrared spectroscopy in attenuated total reflection (ATR) mode to analyze the interactions between the polymeric base and solvent with a photochromic material (spiroiran). We used cellulose acetate as polymeric base and the spiroiran; 1,3,3 trimethyl indoline-5-nitro benzopyrane. Thin films with different weight concentrations of SP were deposited in the polymeric base. The infrared spectra show bands whose frequencies are associated to several molecular bondings. It was observed a decreasing in intensity of absorbance for C=O stretching mode of the acetate group at  $1720\text{ cm}^{-1}$  and for C=C stretching mode for the main chain at  $823$  and  $982\text{ cm}^{-1}$  both associated to the presence of SP in polymeric films.

### 1. Introduction

Spiropyran (SP), have a great potential for applications in optical devices, for example as data storage films and waveguides<sup>1,2</sup>, principally because of their physical and chemical properties would be controlled by laser illumination. In general, SP absorbs in the ultra violet (UV) region and not in the visible region. Upon UV illumination, the SP colorless isomer undergoes heterolytic cleavage of the NO bond to form the colored isomer (merocyanine). The coloration change (colorless to blue) in the sample is the physical observation of the molecular transformation. This process can be reversed by visible illumination. Figure 1 shows this process, the cis-cisoid isomer is an intermediate process in this molecular transformation and it is associated to sample degradation<sup>3</sup>.

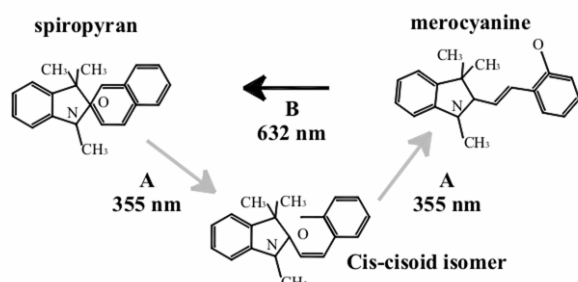


Figure 1. Schematic molecular structure of the sample before UV illumination (i.e.  $\lambda = 355\text{ nm}$ ) and after isomerization. The process is reversible under visible illumination (i.e.  $\lambda = 633\text{ nm}$ ). The X isomer is an intermediate process in the conversion cycle between spiropyran to merocyanine.

The radical group NO would be change to obtain different absorption peaks for the merocyanine state. The principal features of these materials are the several cycles of conversion and reversion process that could be done. Otherwise each cycle generate a decreasing in the optical properties of the sample.