SYNTHESIS AND CHARACTERIZATION OF ELECTROPOLYMERIZABLE DERIVATIVES OF N-SALICYLDENE (ANIL) FUNCTIONALIZED BIS EDOT-CARBAZOLE

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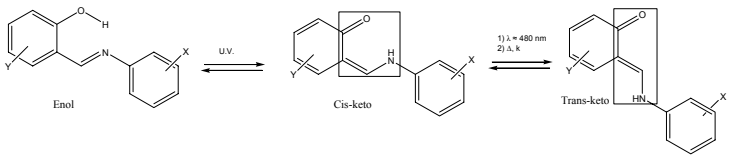
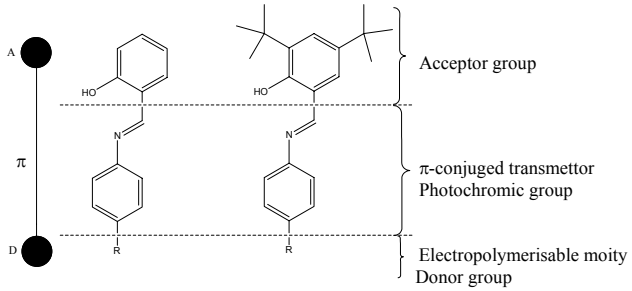
A great deal of attention has been focused on conjugated polymers due to the broad range of applications for which they are potentially useful.[1] Photovoltaic devices, LED's, field effect transistors, electrochromic devices, and various types of sensors are under investigation by numerous researchers around the world. As such, the search for new functional and responsive conjugated polymers exhibiting electrochromism, photochromism or NLO properties are especially sought after for use in such applications as display technology or data storage. Preparation of conjugated photochromic polymers leads the development of original materials which are good candidates for optical switches and storage devices. In designing a photochromic conjugated polymer, several can be taken. In the simplest approach the photochrom can be attached as a pendant group to the polymer backbone through a nonconjugated linkage. In the second approach a fully conjugated polymer is synthetized in which the conjugation of the photochrom is continuous with the backbone by either incorporating the photochrom directly in the backbone or using a fully pendant group. Such fully conjugated polymers are especially interesting because of the possibility for a cooperative interaction between the polymer and the photochrom due to the continuous electronic conjugation.[1]
Because of their interesting physical properties under irradiation of their photochromic groups, molecules based of carbazole-anils and EDOT-carbazole-anils derivatives are investigated. Anils (salicylidenes-anilines) are interesting class of photochrom. The mechanism for the photochromism is based on a tautomerization reaction as shown in scheme 1.



Sheme 1: Tautomerization of anils

The enol form is colorless, but upon irradiation with UV light the colored keto form is produced.[2]
Optimized synthesis of anil-carbazole monomers in one pot permits to obtain some derivatives whose substituant effect were studied.



Scheme 2: New photochromic monomers

These monomers are deposed on a glass substrate as a solid film to be studied under irradiation. It is shown that the photochromic character of these molecular films is exalted by addition of tertiobutyl groups on the phenolic ring.
A reversible photo-commutation is then possible. Monomers CzAnil **1** (Z = H) and CzAnil **2** (Z = tBu) were electropolymerized by cyclic voltamperometry and chronopotentiometry in nitrobenzene TBAP 0.1 M (Figure 1 a). Conducting polymer films are obtained on platinum and ITO electrodes.

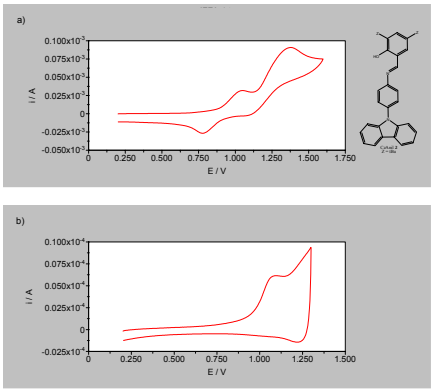


Figure 1: Electrosynthesis (a) and characterization (b) of poly (CzAnil **2**)

These new polymers films were electrochemically characterized by cyclic voltamperometry in nitrobenzene TBAP 0.1 M (Figure 1 b) from neutral to conducting state.
The potential applied to the polymer-coated electrode was sequentially increased to higher potentials to oxidize the polymer while monitoring the creation of the charge carriers. An evolution of polymer redox process is observed at $E_{1/2}$ = 1.12 V vs Fc/Fc^+ for poly-(Cz-Anil**1**) and $E_{1/2}$ = 1.15 V vs Fc/Fc^+ for poly-(Cz-Anil**2**).
Furthermore polymerization study of EDOT-carbazole-EDOT derivatives is also under investigation to obtain resistant polymers films with attractive photonic and electronic properties.[3]

References:

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