Synthesis of Poly(*m*-pyridylene-1,2-diphenylvinylene)

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Abstract: The synthesis by dehalogenating polycondensation and characterization of a new soluble conjugated polymer, poly(*m*-pyridylene-1,2-diphenylvinylene), DP-PPyV, is reported here. It shows good mechanical properties and a λ_{max} = 330 nm. The maximum intensity peak of MALDI-TOF corresponds to 1.800 Da.

Keywords: conjugated polymers, pyridine units, synthesis.

Introduction

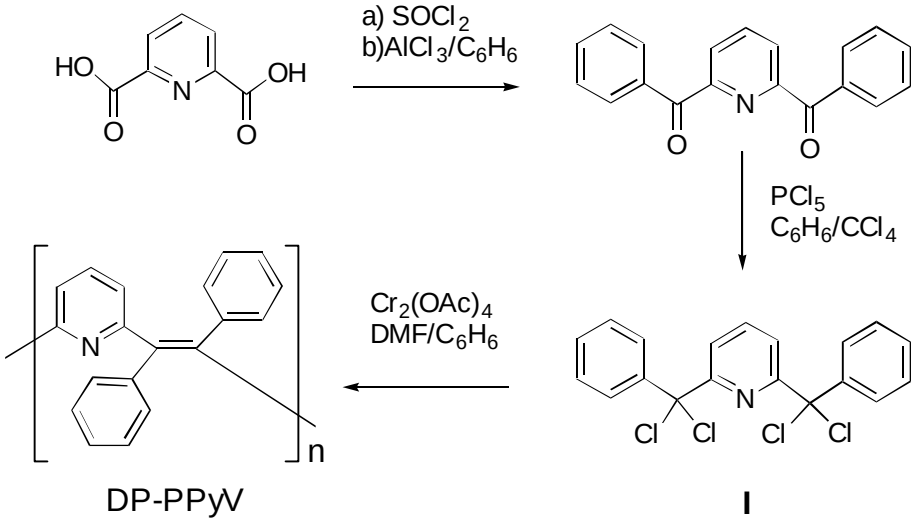
Pyridine-containing conjugated polymers are considered promising candidates for light-emitting devices [1]. Polymers such as poly(*para*-pyridylenevinylene), PPyV, or their copolymers, ie., poly(*meta*-pyridylvinylene) co-(*para*-phenylenevinylene) are highly luminescent [2]. Since these nitrogenated polymers have a higher electron affinity than the non-nitrogenated ones, they are more resistant to oxidation and show better electron transport properties. Moreover, their higher electroaffinity allows the use of more stable metals, ie. Al or Au, or doped-polyaniline as the electron injecting electrode in polymer light-emitting diodes. The lineal polymer P*p*-PyV emits at *ca.* 600 nm (orange red) so polymer structural changes are necessary in order to get a broader emissive spectral range. As it is well known the reduction of the cromophore effective length results in a bathocromic shift. Therefore, poly(*m*-pyridylene-1,2-diphenylvinylene), DP-PPyV, is a potential candidate to be used in the lower wavelength of the visible spectral region. The synthesis by dehalogenating polycondensation and characterization of this new soluble conjugated polymer, DP-PPyV, is reported here.

Experimental

The synthetic route is shown in Scheme 1. Monomer and low molecular weight compounds were characterized by ^{1}H NMR, ^{13}C NMR, FTIR and elemental analysis. In adition to these techniques, the polymer was characterized by UV, GPC and MALDI-TOF.

Results and Discussion

The polymer is soluble in common organic solvents. Then, it was possible to perform GPC characterization on it. This technique, however, gave inconsistent results. In THF, a Mn *ca.* 6,500 Da. and a non-typical value for the polydispersion (*ca.* 5.0) were obtained. On the other hand, much higher values were observed in DMF, i.e., Mn = 21.000 and Mw/Mn = 52. So, the former values could indicate that there are some polymer aggregation phenomena as well as some adsorption on the GPC column gel. The absolute determination of the molecular mass by the MALDI-TOF technique indicated that the maximum intensity signal corresponded to a 1,800 Da and that the molecular weight distribution was near to the one expected for a polycondensation reaction. Moreover, it was possible to determine that the polymer terminal groups were -CH_2Ph, -CHOHPh and -CHOAcPh. Therefore, it is clear that the AcO^- anions play a important role in the polymerization termination steps. DP-PPyV forms stable films on several substrates and possess a λ_{max} = 330 nm.



Scheme 1.

Acknowledgements: Financial support was provided by ANPCyT and SGCyT-UNS. We are indebted to Prof. Dr. K. Mullen (MPI-P, Germany) for help in getting the MALDI-TOF data.

References and Notes

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