

## Highly polarized light emission from layer-by-layer PPV+CR films

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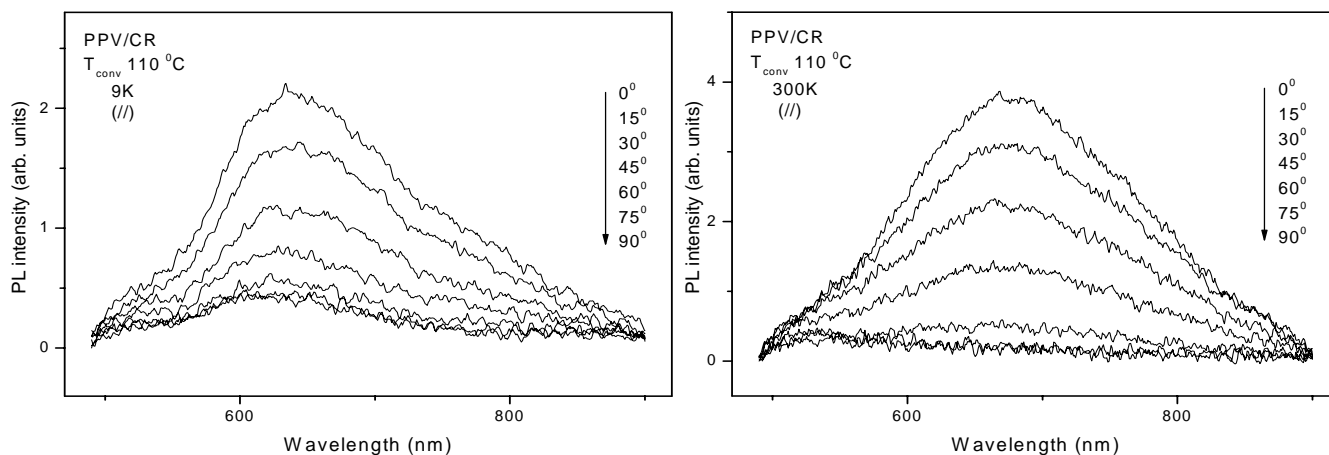
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**Abstract** - LBL PPV/CR films have been processed using the CR azodye as a counter-ion for the PPV precursor polymer, the PTHT. The PL measurements prove the occurrence of the emission from the CR molecules and, the energy transfer from PPV (donor) to CR (acceptor) was demonstrated following the PL quenching from either PPV or CR, depending on the temperature in that the PL measurement is carried out. Layer-by-layer PPV/CR films were converted at 100 and 200 °C and characterized through of analyzes of polarized emission. The PL results show a highly polarized light emission from the layer-by-layer PPV+CR films.

Poly(p-phenylene vinylene) (PPV) conjugated polymer is a promising candidate for optoelectronic applications as an active layer in electroluminescent devices, such as polymer light-emitting diodes (PLEDs) [1]. This is possible due to significant progress in the synthesis route of PPV via a soluble non-conjugated precursor polymer, poly(xylylidene tetrahydrothiophenium) – PTHT [2]. In specific applications, such as polarized PLEDs, where a higher degree of control is required, structural disorder remains a severe limitation [3]. Highly anisotropic optical properties is, therefore, highly desirable, for instance, in this type of PLEDs. Control over the molecular and supramolecular organization may therefore have great influence on the optical and electrical properties of these devices. In this work, PPV layer-by-layer (LBL) films have been processed using the congo red (CR) azodye as a counter-ion for the PPV precursor polymer, the PTHT. The absorption spectra of the PPV/CR films show a wide band which extends up to a wavelength range larger than the PPV absorption, indicating that the CR molecules are not eliminated during the thermal conversion process. The sample converted at low temperature (110 °C) preserves the CR absorption band at approximately 550 nm while this band is thermally degraded when the sample is converted at high temperature (230 °C). A strong polarization effect was observed in the PPV/CR emission. In this polarized energy transfer process, the polymer (PPV) acts as a donor and the dye acts as an acceptor and re-emitter. The PPV absorb light (vertically or horizontally) polarized and subsequently transfers the energy to the oriented CR molecules, which emits polarized light, with maximum value, at the direction parallel to the dipping direction.



**Figure 1.** Polarized PL spectra from PPV/CR (110 °C) sample obtained at 9 K and 300 K as a function of the angle between the direction of the analyzer polarization and the dipping direction

### References

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