

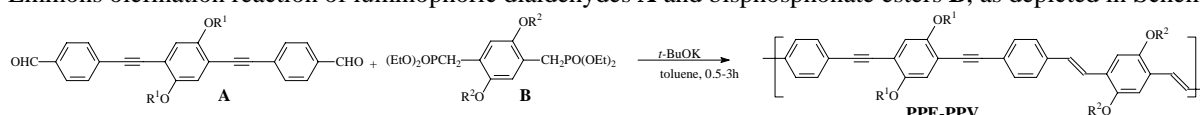
Combined Effects of Alkoxy Side Chains and Film Thickness on the Properties of Inkjet Printed Libraries of PPE-PPV Copolymers

D. A. M. Egbe^{1*}, E. Tekin², T. Blaudeck¹, U. S. Schubert², R. Baumann¹

¹ Institute of Print and Media Technology, Chemnitz University of Technology, Reichenhainer-Str. 70, D-09126 Chemnitz, Germany. * daniel-ayuk-mbi.egbe@mb.tu-chemnitz.de.

² Laboratory of Macromolecular Chemistry and Nanoscience, Eindhoven University of Technology and Dutch Polymer Institute (DPI), PO Box 513, 5600 MB Eindhoven, The Netherlands.

This contribution reports on the synergetic effects of position and length of side chains, film thickness and thermal treatment on the optical properties of a series of high molecular weight and defect-free four-fold alkoxy-substituted poly(*p*-phenylene-ethynylene)-*alt*-poly(*p*-phenylene-vinylene)s (PPE-PPV) which were synthesized via Horner-Wadsworth-Emmons olefination reaction of luminophoric dialdehydes **A** and bisphosphonate esters **B**, as depicted in Scheme 1.^{1,2}



Scheme 1: General representation of the synthesis of PPE-PPVs

The thickness libraries of the different PPE-PPVs were prepared by inkjet printing in a controlled manner. For the printing experiments an Autodrop system (Microdrop Technologies, Norderstedt, Germany) was used, consisting of an automated XYZ-stage and a stroboscopic video camera for visualisation of the drop ejection. The optical properties of the printed libraries were screened utilizing high-throughput methods. It was found that the emission colors of the investigated polymers strongly depend on the interchain interactions which increase with increasing film thickness and influenced by the side chains (Figure 1). It was possible to establish a correlation between the intensity of the S₁₋₀ → S₀₋₂ vibronic transition and the red shift of the emission color. Moreover upon annealing at 70 °C for 2h, white emission was observed from thick printed films. The white emission is a result of broadened emission spectra covering the whole visible region of the light spectrum, attributed to increased aggregation due to enhanced planarization of the polymer backbone.³

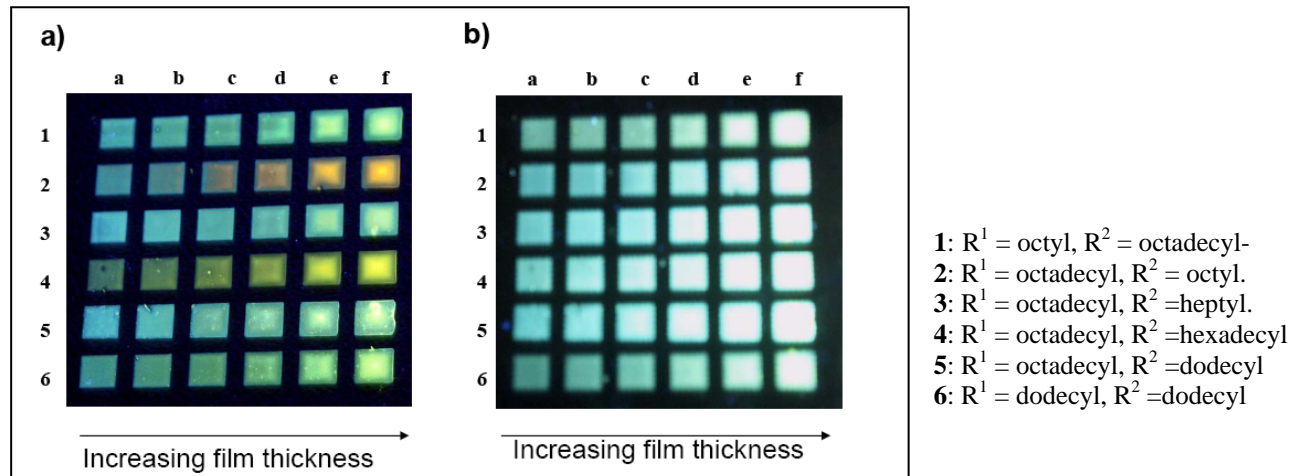


Figure 1. Emission color of inkjet printed PPE-PPVs **1-6** thin film libraries under illumination at 390 nm, a) before and b) after annealing at 70 °C for 2h. Film thickness varies from approximately 50 nm (column a) to 150 nm (column f).

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2. Tekin, E.; Egbe, D. A. M.; Kranenburg, J. M.; Ulbricht, C.; Rathgeber, S.; Bircner, E.; Rehmann, N.; Meerholz, K.; Schubert, U. S. *Chem. Mater.* **2008**, *20*, 2727.
3. Tekin, E.; Wijlaars, H.; Holder, E.; Egbe, D. A. M.; Schubert, U. S. *J. Mater. Chem.* **2006**, *16*, 4294.