**Introduction**

The Microdrop Autodrop piezoelectric inkjet printer is shown alongside the Microdrop AD-K-501 Micropipette and the MD-K-130 Dispenser Head.

Inkjet printing technology is applied to deposit small quantities of functional materials with specific electrical, optical, chemical, biological or structural functionalities onto well-defined locations on a substrate. In many cases, these materials are processed from a liquid solution or dispersion. Therefore, inkjet printing is becoming a more attractive technique for many applications, such as fabrication of electronic circuits, LCDs, and biocells, to name a few. Moreover, it can be considered as a library preparation technique for functional polymers or nanocarriers allowing for a systematic variation of parameters, e.g., thickness or chemical composition for combinatorial studies.[1][2]

Well-defined and flat thin films of MEH-PPV for potential device applications, e.g., as polymer field effect transducers, can be obtained by patterning the solutions using inkjet printing. The efforts of alternating interactions of MEH-PPV in different organic solvents on the processibility, film formation and electrical characteristics were investigated.[3] PPE-PPVs (polypyrrenylethene-pyrene, pyrene) with different alkyl side chains are attractive materials since they have a relatively low band gap and tunable emission color.[4] Printing of PPE-PPV's was performed and their thin film properties were investigated.

Selected microscopic camera images of electrophoresis of MEH-PPV solutions (2.5 mg/ml) from different solvents: a) (oxygen), b) chloroform, c) THF.

**Printing of MEH-PPV Lines and Films**

Figure 1. Top: Microscopic images of MEH-PPV lines written from different solvents. Bottom: Corresponding cross-sections, which were obtained utilizing an optical profilometer. The results illustrate that the film thickness varies with the solvent and its volume, improving the lamination effect. This effect was exploited by the increased inter-planar interaction in those non-polar aromatic solvents.[5]

The volume of an electrophoretic droplet depends on the nozzle diameter and the voltage applied to the nozzle element. The graph illustrates that the volume of a droplet significantly increases with an increase of the applied voltage. The duration of voltage pulse width has no effect on droplet volume.

**Printing of Libraries of PPE-PPV's**

A series of PPE-PPVs were synthesised, whose side chains were varied to give different emission colors. These were inkjet printed using a tetrahydrofuran-dithiothreitol-methanol mixture on glass substrates at a low temperature to form thin film libraries. The aim of this project was to investigate in formation of different substrates as well as to optimise the printing conditions to obtain homogeneous and reproducible polymer films and finally to assess their optical properties.

**Dot Spacing:** 180, 160, 140, 120, 100, 80 μm

**Increasing Thickness**

The optical properties of the luminescent films were rapidly scanned utilizing an UV/Vis/Fluorescence plate reader. We studied the combinatorial effects of side chains and film thickness on the absorption and emission behavior of side alkyl-substituted PPVs which are shown above. There is a clear increase in the intensity of the transition with increasing thickness, especially in the case of polymer 2, which is due to the superposition of the 0-0 inelastic transition with excimer emission.

**Acknowledgements**

The authors acknowledge the Dutch Polymer Institute (DPI, Cluster NEMS/NIK) for financial support and microdrop Technologies for collaboration. They thank J. van den Berg, Petra J. Smith and Tan de Leeuw (Phaes) for kindly acknowledging them.

**References**