Poly(p-phenylene vinylene): Highlights within the SFB 595

Nicole Vilbrandt, Matthias Rehahn
Ernst-Berl-Institute for Technical and Macromolecular Science, Technical University of Darmstadt, 64287 Darmstadt, Germany

Project A5
Jens Wiesecke, Jens Langecker, Thorsten Schwalm, Michael Preuß, Marco Schütz, Serena Nickel, Regina Sander, Valentina Rittscher, Astrid Schönberger

Motivation
The motivation for the investigations in project A5 was the insufficient life-time, color-stability and efficiency of organic light-emitting diodes (OLEDs) based on polymeric semiconductors. Obviously the lack of performance was mainly caused by defects and impurities.

Therefore the intention here was to investigate:
• the relevance of constitutional defects and impurities for OLED applications,
• their origin during synthesis,
• a procedure to avoid or at least minimize their amount in resulting polymers.

Later on our goal was the development of measures to systematically change emission color of Poly(p-phenylene vinylenes) (PPVs) from orange-red towards blue emission.

In this context we were investigating:
• the influence of a variety of lateral substituents attached at different positions of the polymeric backbone,
• the influence of those substituents on the formation of constitutional defects during synthesis.

In addition we were focusing on the thermal and morphological behavior of PPVs.

To investigate morphological changes we were monitoring:
• changes for the glass-transition temperature of the polymers,
• changes in the crystallinity of the polymer-films with help of polarization microscopy.

Results
Constitutional defects result from the radical chain growth mechanism of the Gilch polymerization.

Transfer of the emission center to the lateral substituents.

Attachment of lateral substituents at the vinylene double-bonding.

Bulky lateral substituents in 2,3-position of the polymeric backbone.

Publications last funding period


5 Key Publications (2003-2014)


