Thermo-cleavable solvents for printing conjugated polymers: Application in polymer solar cells - DTU Orbit (23/01/2019)

Thermo-cleavable solvents for printing conjugated polymers: Application in polymer solar cells

The synthesis and characterization of a number of so-called thermo-cleavable solvents are described with their application in all-air, all-solution and all-screen-printed polymer solar cells. These solvents were developed to meet some requirements for printing techniques such as long “open time” combined with fast drying on heating that cannot be attained with the usual solvents used for conjugated polymers. The new solvents have low volatility at ambient conditions, but decompose thermally at 130–180 °C to low-boiling and highly volatile products. Characterization by thermogravimetric analysis (TGA) and high-temperature NMR established the onset temperature of decomposition, the rate of the reaction and the nature of the products. Printing experiments with inks based on these solvents together with conjugated polymers are exemplified for polymer solar cell devices to show how they enable large-scale production of polymer solar cells using screen printing. Screen-printed solar cells are still very inferior to state of the art P3HT/PCBM technology, but it is our view that it is necessary to explore these printing technologies if polymer solar cells are to ever become commercial products.

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