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Inkjet printing of chemically tailored light-emitting polymers

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Abstract

For the implementation of an inkjet printing process in the fabrication of organic devices, like organic light emitting diodes (OLEDs), challenges such as the control over film formation need to be overcome in order to benefit from inkjet printing as a mask-free, material-efficient, non-contact and on-demand patterning technique. In this contribution, three different polymers with tailored properties were synthesized that reveal red, green and blue (RGB) emission colors. Film formation and thin-film properties were investigated in a combinatorial screening approach *via* inkjet printing. The solvent system toluene/*ortho*-dichlorobenzene revealed for all three polymers suitable film formation characteristics with final film thicknesses of 80 nm using a concentration of 4 mg/mL. Important relationships between polymer properties (molar mass), ink characteristics (viscosity) and film formation qualities (thickness, roughness) were identified. Finally, OLED devices were manufactured whereby the light emitting layers were inkjet printed using optimized processing conditions.

Keywords: π -conjugated polymers, chemical tailoring, inkjet printing, thin-film libraries, organic light emitting diode

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