

Femtosecond-laser direct writing for spatially localized synthesis of PPV

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Abstract

Poly(p-phenylenevinylene), or PPV, is a polymer of great technological relevance due to its electroluminescence properties, which have been exploited in organic light emitting diodes, flexible displays and other optoelectronic devices. Although PPV is a material of foremost importance for many applications, its synthesis on the nano/microscale cannot be achieved through the standard method that uses heating of a precursor polymer. This paper shows how direct laser writing with femtosecond pulses can be employed for the synthesis of PPV in pre-determined regions, allowing a novel approach towards the precise fabrication of complex polymeric microcircuits. The physical-chemical phenomena involved in the conversion of the precursor into PPV are shown to be related to a two-photon induced thermal process, which is confined to the focal volume, resulting in the controlled synthesis of PPV.

keywords

Display devices, Electromagnetic pulse, Flexible displays, Light emitting diodes, Optical waveguides, Optoelectronic devices, Organic light emitting diodes (OLED), Polymers, Ultrafast lasers.