

Direct thermal patterning of a pi-conjugated polymer

A method for the direct thermal patterning of a thermally labile pi-conjugated polymer film containing a NIR sensitive dye using a continuous wave 830 nm NIR diode laser is described. The method is demonstrated with poly(3-(2-(2-tetrahydropyranyloxy)ethyl)thiophene) (PThPET), which is rendered insoluble upon localized heating with the NIR irradiation due to catalytically enhanced elimination and volatilization of dihydropyran. The optical and photophysical properties of the patterned pi-conjugated material are described. High-resolution pixels (10 μm) of conjugated polymer can be obtained with laser dosages as low as 600 mJ/cm^2 at laser scan speeds of 0.6 m/s . The method is capable of imaging large surface areas, up to 1 m^2 , at relatively high throughput and with micrometer size resolution, and thus could find application where the patterning of electroluminescent and/or conducting organic materials are required.