Effect of processing parameters on Poly (9,9-dioctylfluorene-co-bithiophene) based organic field-effect transistors

Amit Jain, Monica Katiyar*, Parmeswar K. Iyer[1]
Department of Materials and Metallurgical Engineering,
Samtel Center for Display Technologies,
Indian Institute of Technology Kanpur, India-208016
[1]Department of Chemistry,
Indian Institute of Technology Guwahati, Assam, India
*mk@iitk.ac.in

Abstract

Semiconducting conjugated polymer thin-film transistors (TFTs), based on solution processing, have potential applications as key elements of integrated logic circuits and optoelectronic devices on flexible plastic substrates. One of the main criteria to obtain high charge carrier mobilities has been found to be a high degree of structural order in the active semiconducting polymeric material. In this regard, we fabricate and characterize poly(9,9-dioctylfluorene-co-bithiophene) (F8T2) thin film transistors (TFTs) by spin coating route. The devices fabricated behaved as enhancement type transistors. Mobility for normal top contact devices is comparable with the reported values for F8T2 TFTs. We, further, attempt to align the F8T2 by changing process conditions and annealing treatment. The films from the solution made in xylene were studied for film quality as measured by AFM, absorption spectroscopy, and photoluminescence spectra. We will discuss possible correlations between film microstructure and F8T2's field effect mobility.