An alignable fluorene thienothiophene copolymer with deep-blue electroluminescence at 410 nm

Malte C. Gather et al

Electronic supplementary information:

Materials and Measurements: $^1$H and $^{13}$C NMR spectra were recorded on a Bruker AV-300 (300 MHz), using the residual solvent resonance of CDCl$_3$ as an internal reference and are given in ppm. Microanalyses were obtained with an elemental vario EL analyzer. Mass spectra were obtained either with an Agilent GCMS using a 6890 series GC with a 5973 MSD (EI). Molecular weight determinations were carried out in chlorobenzene solution at 60°C on an Agilent 1100 series HPLC using two Polymer Laboratories mixed B columns in series, and the system was calibrated against narrow weight PL polystyrene calibration standards. DSC measurements were performed on a TA Q100 under nitrogen. Reactions utilising microwave heating were performed on an Emrys Creator from Personal Chemistry Ltd. All starting materials and reagents were purchased from Aldrich Chemicals and Lancaster Chemicals. Anhydrous solvents were purchased from Romil Ltd and transferred using standard Schlenk line techniques. Column chromatography and TLC were performed on silica gel 60 (70-230 mesh, Merck) respectively.

Thin films: Orientation layers of rubbed polyimide were made from a two component polyimide precursor (Liquicoat PI ZLI 2650, Merck Chemicals) according to the standard procedure in the literature. A thin film of F8TT was deposited atop the alignment layer. Alignment of the film was achieved by annealing and subsequent quenching to room temperature within the confines of a nitrogen atmosphere glove box.

Photoluminescence measurements with temperature: PL spectra were recorded using an Oriel Instaspec CCD camera and an Oxford Instruments CCC1204 exchange gas cryostat.

LED fabrication and measurement: Indium tin oxide coated glass substrates were thoroughly cleaned in IPA and acetone before deposition of a 40 nm thick layer of PEDOT:PSS (Baytron P Al4083) under clean-room conditions. After transfer to a nitrogen glovebox (with active column-based water, solvent and oxygen removal) the substrates were heated to 200°C for 5 min to remove residual water before the F8TT layer was spin-coated from a toluene solution. The Ba/Al cathode layer was deposited by thermal evaporation under high vacuum (< 4x10$^{-6}$ mbar). Current density-voltage-luminousity measurements were conducted using a luminance meter and Keithley source/measure units. EL spectra were recorded using an Oriel Instaspec CCD camera.