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Large Magnetoresistance (%10 at 10 Mt, 300k) in Semiconducting Polymer Thin Film Devices OMER MERMER, Department of Physics, University of Iowa, GOVINDARAJAN VEERARAGHAVAN, THOMAS FRANCIS, Department of Electrical and Computer Engineering, University of Iowa, MARKUS WOHLGENANNT, YUGANG SHENG, DUC NGUYEN, Department of Physics, University of Iowa — We have performed comprehensive magnetoresistance (MR) study on a set of polymer sandwich devices made from different pi-conjugated polymers, namely Poly(9, 9-dioctylfluorenyl -2,7 diyl) (PFO), Poly(3-hexylthiophene-2,5-diyl) (RR-P3HT) and Poly(3-octylthiophene-2,5-diyl) (RRa-P3HT). The measurements were performed at different voltages and temperatures, ranging from 10K to 300K, and at weak magnetic fields, $B < 100mT$. This magnetoresistance effect we discovered is amongst the largest of any bulk material. We find that the effect is related to hole current in the devices. We observed large negative and positive magnetoresistance dependent on material and operating conditions. A peculiar transition occurs between negative and positive MR region. We compare the results obtained in devices made from different materials with the goal of providing a detail picture of the polymer MR effect. We discuss our results in the framework of known MR mechanisms and find that none of the existing models can explain our results.

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