FLOW-INDUCED ALIGNMENT OF A NANOFIBROUS PERYLENE DIIMIDE—POLYELECTROLYTE COMPOSITE

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Perylene diimides form a class of n-type organic semiconductor that have been previously shown to have promising applications in organic based photovoltaic devices. However, many of these early devices suffer from poor photoelectrical conversion efficiencies. In an attempt to rectify these inefficiencies, new material formation processes focusing on macroscopic organization, efficient molecular packing, and uniform molecular layers have been explored. Previously, we have reported on the spontaneous self-assembly of an insoluble nanofibrous composite material prepared from water-soluble perylene diimide and polyelectrolyte precursors. In this report we present an extension of the prior work in which nanofiber orientation is controlled via flow induced alignment within microfluidic channels. This alignment technique allows for the controlled growth of a fibrous composite network in an *in situ* layer-by-layer fashion. By sequentially flowing water soluble perylene diimide, poly(acrylic) acid and rinsing solutions through a microfluidic device, an organized, aligned nanofibrous composite is formed. The microfluidic channels are machined from a polycarbonate chip having a channel width of about 700 microns, height of 1 millimeter and a deposition length of 1.5 cm. The effect of flow rate on composite deposition and fiber alignment will be presented.