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Conformation Effects on the Photoluminescence Behavior of Anchored MEH-PPV Pancakes and Brushes KUO SHENG SHIH, PO-TSUN CHEN, ARNOLD C.-M. YANG, Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan 30013 — Single molecular layer of poly[2-methoxy-5-(2'-ethylhexyl)oxy)-1,4- phenylenevinylene] (MEH-PPV) grafted on primed silicon wafer were synthesized, forming brushes (chain spacing 0.54 nm via graft-from) or pancakes ($\sim$ 7nm to 34 nm via graft-to). For the tight-packed brushes, the PL emission peak, residing in the range from 434 nm to 550 nm depending on the chain length, was generally unchanged when transferring between the dry and solvent immersion states. However, for the pancakes, the emission peak blue-shifted dramatically (up to 100 nm) when dried in the air relative to that in the solvent. These shifts were fully reversible in the dry-wet cycles. The large blue shifts of the anchored pancakes were attributed to the mechanical stretching of entangled MEH-PPV segments in contact with substrate upon solvent loss. In contrast, the blue shifts disappeared and small red shifts emerged instead for extremely slowly drying (24 hrs drying time), revealing the stress-relaxation pathways in the equilibrium conditions. The drying-induced blue shift was also observed in the un-anchored drop-casting samples but the reversibility vanished. Finally, a large enhancement of PL intensity was accompanied with the blue shifts, manifesting the effect of the molecular constraints.

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