BHJ-based solar cells. It was found that the PDI pendants tended to π-π aggregate with other nearby PDI units in C11PDI HP and C7PDI HP, even in dilute solution, with large changes in the absorption and emission spectra on going from the monomer to polymer. Such π-π stacking in polymer side-chains could be largely suppressed by the incorporation of functional groups in the bay positions. However, this resulted in poor OFET and OPV performance for N-PDI HP, despite the fact that it showed a broader and more red-shifted absorption spectrum relative to those of C11PDI HP and C7PDI HP. The OFETs based on C11PDI HP and C7PDI HP gave electron mobility of up to ca. 5 × 10⁻⁵ cm²V⁻¹s⁻¹ after thermal annealing. In the solar cells made from the P3HT:PDI HP blends, devices based on C11PDI HP exhibited moderate performance with a PCE up to 0.38 ± 0.02% without optimization. This value is among the highest reported PCEs for PDI/P3HT blends. The study of P3HT:PDI HP blends with KPSM indicates more favorable morphology from P3HT:C11PDI HP blends over P3HT:C7PDI HP blends, including a much smoother surface and possible small domain size. This may provide useful information for further design of donor–acceptor type diblock copolymers with PDI-based pendants. In summary, the current study indicates that C11PDI HP blended with P3HT shows better performance in solar cells than the other two polymers. C11PDI will be chosen as the building block in preparing the D–A type diblock copolymers shown in Chapter 3.

2.10 Experimental section

General: Most organic and inorganic chemicals in this chapter were obtained from Aldrich, Alfa Aesar, and TCI and used without further purification. 1-Undecyl-