Organic Semiconductor Interfaces and Their Effects in Organic Solar Cells

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Abstract

Energy levels and energy level alignment at interfaces play a decisive role in designing efficient and stable organic solar cells (OSCs). In this review two usually used technologies in organic photovoltaic communities for measuring energy levels of organic semiconductors, photoelectron spectroscopy and electrochemical methods, are introduced, and the relationships between the values obtained from the corresponding techniques are compared. The energy level and energy level alignment across the interfaces involved in solution processed organic photovoltaics are described, and the corresponding integer charge transfer model for predicting and explaining energy level alignment are presented. The effects of the interface properties in designing efficient binary and ternary OSCs were discussed. The effects of environmental factors mainly including water vapor, oxygen gas and thermal annealing on energy levels and energy level alignment involved in photoactive layers, and the subsequent effects on the corresponding OSC properties are given.

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