

## **From Nanomolecular Junction to Nano-structured Semiconducting Polymer Organic Solar Cells**

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This presentation discusses recent progress in our group in developing molecular diode assembly and a series of new polymers that exhibit exceptional power conversion efficiency for solar energy harvest. Molecular diodes with diblock co-oligomer structures were developed and demonstrated unambiguous rectification effect. These molecular assembly also exhibit photovoltaic effect, which provide a concept to develop new semiconducting polymers for solar energy harvest. New polymers are designed to possess low band gap to most effectively harvest solar energy. The quinoidal structures give these polymers high rigidity and relatively high charge carrier's mobility. A detailed structural fine tuning led us to discover several polymers that exhibit power conversion efficiency larger than 8%. These are the best results obtained so far for single-layer polymer solar cells. Structure/property correlations will be discussed.