

Polymer Solar Cells: Status and Challenges

René Janssen

Eindhoven University of Technology

Polymer solar cells offer an opportunity for low-cost, large area renewable energy production. Their power conversion efficiency depends on the quantum and energy efficiency by which photons from the sun are converted into current. To be efficient, absorption of light, charge generation, transport and collection *all* have to occur with high quantum efficiency and with minimal losses in energy. Presently, the best polymer solar cells reach power conversion efficiencies close to 8% in solar light and are closing the gap with more traditional technologies.

The lecture will give an overview of the working principles of polymer solar cells and highlight the subtle interplay of chemical and electronic structure, photophysics, charge transport, nanoscale morphology and device architecture in reaching higher efficiencies. Recent morphological and photophysical studies will be presented that provide insights into existing loss mechanisms and improved materials design. The insights provide also directions for future research and technological developments.