

# “Organic Semiconductors for Photovoltaic Application: Science, Expectation and Challenges”

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Field of Research: Organic electronics, Photovoltaic devices, Photodetectors.



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Over the last few decades the need of alternative renewable energy sources has stimulated several exciting scientific research for flexible, efficient and low cost photovoltaic devices. Organic semiconductors have shown the potential of obtaining the cheap and easy methods to produce energy from sun. Although the efficiency of state-of-art devices has reached ~18%, in general it is still lower than the theoretically predicted Shockley-Queisser limit of 21% mainly because of recombination of singlet excitons (SE), charge-transfer excitons (CTE), and free charge carriers, caused by low carrier mobilities. Another attractive feature of polymer electronics lies within its compatibility with high throughput roll-to-roll (R2R) fabrication technique that can be easily adopted by industries for large area applications. However, scalability is often challenging due to the difficulty of producing large-area thin-films in lab condition. Therefore fundamental understanding of photo-physics and charge transport properties of such devices is extremely important to improve their performance both in terms of their efficiency and lifetime. In this presentation various aspect of material design, mitigation of fundamental energy losses and scalability process for organic solar cells will be discussed.