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### Plastic solar cells: where the current begins

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# Stellingen

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## **Plastic Solar Cells: Where the Current Begins**

*Ultrafast Exciton-to-Charge Conversion in Organic Photovoltaics*

door Oleg Kozlov

1. The seemingly simple process of photon-to-charge conversion in organic photovoltaics in fact consists of a number of complex steps, which actually determine the overall efficiency of the conversion (Chapter 1).
2. Ordered systems typically operate better. Significant energetic disorder leads to formation of low-energy traps which considerably reduce the exciton diffusion coefficient (Chapters 2, 3).
3. The morphology of the active layer of an organic solar cell really matters. It not only influences the charge generation efficiency (Chapter 3) but it may even change the whole operation principle of the device (Chapter 6).
4. Intermolecular interactions are of utmost importance: the photophysics of an isolated molecule has nothing in common with the same molecules packed in a solid film (Chapter 4).
5. It is not easy to get something but it is even harder to keep it. In the photovoltaic donor-acceptor blend, it is crucial to get separated charges, but even more important to suppress their recombination (Chapter 5).
6. Energy disorder in organic solar cells has positive sides, too. For instance, it can facilitate interfacial charge separation. (Vithanage *et al.*, Nat. Commun. 4, 2013; Hood & Kassal, J. Phys. Chem. Lett. 7, 2016).
7. Similar approaches can be used to interrogate essentially different systems. For example, the exciton diffusion in organic semiconductors and in quantum dot films is studied with the same method. (Akselrod *et al.*, Nano Letters 14, 2014).
8. To the date, organic solar cells are neither more efficient nor cheaper compared to their inorganic counterparts. On the positive side, this raises a lot of scientific questions to make us occupied for a long time.
9. Sometimes it is more useful to stop acting and start thinking.
10. After four years in the Netherlands, you start considering “no rain” as good weather. If additionally there is no wind, you can go to the beach. Even in the winter.