

Department of Physics

Condensed Matter Physics

Clarendon Laboratory, Parks Road, Oxford OX1 3PU



UNIVERSITY OF
OXFORD

CONDENSED MATTER SEMINAR

Thursday 20th October at 2.15pm

“Polymer and hybrid nanostructures for applications in organic solar cells investigated with advanced scattering techniques”

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Organic solar cells are an interesting alternative to conventional silicon based solar cells as they feature new possibilities introduced by using a different class of materials namely polymers.

Instead of expensive ultra-high vacuum technologies, fabrication can be done at room temperature, using wet chemical processing, and thereby enabling usage of methods such as roll-to-roll printing. As a consequence, the production of organic solar cells has the potential to become very cheap and easy. Moreover, the use of polymers allows for flexible solar cells and light weight devices, which will be usable in a very different fashion as compared to the immobile silicon solar panels. In addition, the energy payback times of organic solar cells are significantly shorter as compared to the today's silicon solar cells. However, despite all these significant advantages of organic solar cells, still fundamental knowledge is very limited.

In particular, it is challenging to detect the complex morphologies, which are necessary to have high efficiency organic solar cells. The combination of grazing incidence small and wide angle x-ray scattering (GISAXS and GIWAXS) allows for overcoming these challenges.¹⁻⁴ The crystalline structure is probed with GIWAXS and the mesoscale structure is determined with GISAXS. Based on selected examples, the impact of different layers in the functional stack build-up of organic solar cells,^{5,6} in-situ studies during printing⁷ and in-operando studies of organic solar cells⁸ are presented.

References

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- [8] C.J.Schaffer, C.M.Palumbiny, M.A.Niedermeier, C.Jendrzejewski, G.Santoro, S.V.Roth, P.Müller-Buschbaum: *A direct evidence of morphological degradation on a nanometer scale in polymer solar cells*; Adv. Mater. **25**, 6760-6764 (2013)

**Host: Josue Martinez Hardigree
Audrey Wood Seminar Room, Clarendon Laboratory**