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Backfilling of Mesoporous Titania Structures with Heavy Element Containing Small Molecules and High-Efficiency Polymer PTB7-th

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The future-shaping properties of next-generation solar cells can potentially be achieved through an inorganic-organic hybrid photovoltaics (HPV) approach. Essential for a functioning HPV device is efficient charge separation at the interface between inorganic and organic material.
Due to titania being a wide-bandgap semiconductor and having good electron mobility, it is viable as a mesoporous inorganic structure to be infiltrated by an organic hole-conducting material.
On the organic part, the high-efficiency, hole-conducting polymer PTB7-th is infiltrated into titania films to form the active layer of the photovoltaic device. Additionally, a novel, heavy element containing polymer molecule (Phen-Te-BPinPh) has been synthesized and properties with regard to photovoltaic applications are characterized. To further enhance the solar cell performance, Phen-Te-BPinPh could be implemented either by backfilling into a layered setup between the PTB7-th and the mesoporous TiO2 layer or as a dopant into the PTB7-th.
In determining the backfilling efficiency of PTB7-th and Phen-Te-BPinPh into the mesoporous titania matrix, Time-of-Flight Grazing Incidence Small Angle Neutron Scattering (ToF-GISANS) is the most valuable and significant method of characterization. [1]

[1] M. Rawolle, K. Sarkar, M. Niedermeier, M. Schindler, P. Lellig, J. Gutmann, J-F. Moulin, M. Haese-Seiller, A. Wochnik, C. Scheu, and P. Müller-Buschbaum, ACS Applied Materials and Interfaces, 2013, 5(3), 719-729.

Primary authors: Mr MAERKL, Raphael (TUM Physics E13); Mr HOHN, Nuri (TUM Physics E13); Prof. MÜLLER-BUSCHBAUM, Peter (TUM Physics E13)

Presenter: Mr MAERKL, Raphael (TUM Physics E13)

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