Department of Physics
Condensed Matter Physics
Clarendon Laboratory, Parks Road, Oxford OX1 3PU

UNIVERSITY OF OXFORD

CONDENSED MATTER PHYSICS SPECIAL SEMINAR

Friday 8 May at 16:00
Simpkins Lee Seminar Room, Department of Physics
(https://maps.app.goo.gl/WjG71uLF2D48n85B6)

Template-Designed Organic Electronics

Professor Klaus Meerholz
Institute for Light and Matter, University of Cologne

We report the unique and novel approach of achieving a polycrystalline thin film consisting of uniaxially aligned domains by using 7-armchair graphene nanoribbon (7-aGNR) monolayers as van-der-Waals template. For this purpose, the merocyanine dye HB238 was evaporated on 7-aGNRs, previously transferred on quartz glass substrates. The alignment of the formed molecular aggregate along the GNR alignment direction was proven by polarisation dependent absorbance spectroscopy, revealing a strong linear dichroism. The J- and H-transitions, formed by the HB238 aggregate, were correlated with distinct axes of the single crystal structure. By combining this correlation with polarisation dependent absorbance measurements and X-ray diffraction experiments we elucidated the three-dimensional structure of the formed aggregate thin film. We incorporate these highly anisotropic thin films in optical microcavities and in organic field-effect transistors to study the directional dependency of light-matter coupling and charge transport.

Influencing optical and charge transport properties by controlling the molecular interactions of merocyanine thin films, L. Böhner, P. Weitkamp, T. Limböck, N. Gildemeister, D. Fazzi, M. Schiek, R. Bruker, D. Hertel, R. Schäfer, K. Lindfors, K. Meerholz, Org. Chem. Front. 12, 1086-1098 (2025), https://doi.org/10.1039/D4QO02088J

Strong Light–Matter Interaction of Molecular Aggregates with Two Excitonic Transitions, R. Schäfer, L. Böhner, M. Schiek, D. Hertel, K. Meerholz, K. Lindfors, ACS Photonics 11, 1, 111-120 (2024), https://doi.org/10.1021/acsphotonics.3c01042

Polarization-controlled strong light-matter interaction with templated molecular aggregates, R. Schäfer, P. Weitkamp, O. Erdene-Ochir, K. Meerholz, K. Lindfors, J. Adv. Optical. Mater. e00998 (2025), https://doi.org/10.1002/adom.202500998

Host: Professor Moritz Riede