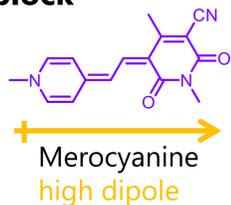


Vincenzo Grande, Frank Würthner

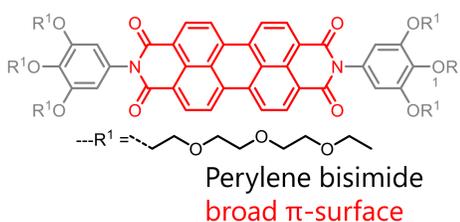
Universität Würzburg, Institut für Organische Chemie und Center for Nanosystems Chemistry, Am Hubland, 97074 Würzburg, Germany
e-mail: vincenzo.grande@uni-wuerzburg.de, wuerthner@uni-wuerzburg.de

Supramolecular Dye Self-assembly

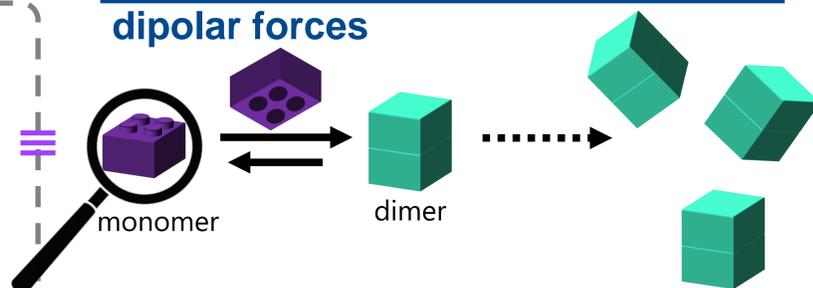
1) Programming the building block



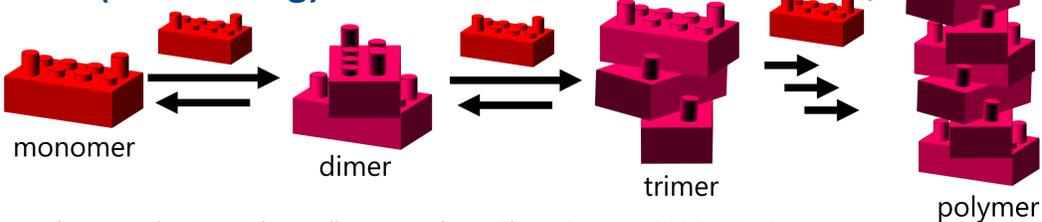
F. Würthner, *Acc. Chem. Res.* **2016**, 49, 868



dipolar forces



Van der Waals forces (π -stacking)



Z. Chen, A. Lohr, C. R. Saha-Möller, F. Würthner *Chem. Soc. Rev.* **2009**, 38, 564;
F. Würthner, C. R. Saha-Möller, B. Fimmel, S. Ogi, P. Leowanawat, D. Schmidt *Chem. Rev.* **2016**, 116, 962;

2) Programming the conditions

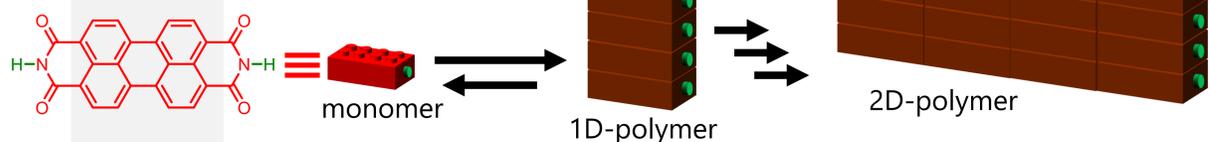
- 1) Solvent
- 2) Concentration
- 3) Temperature
- 4) other species (cations, anions, molecular guests, pH,...)

... build advanced functional materials

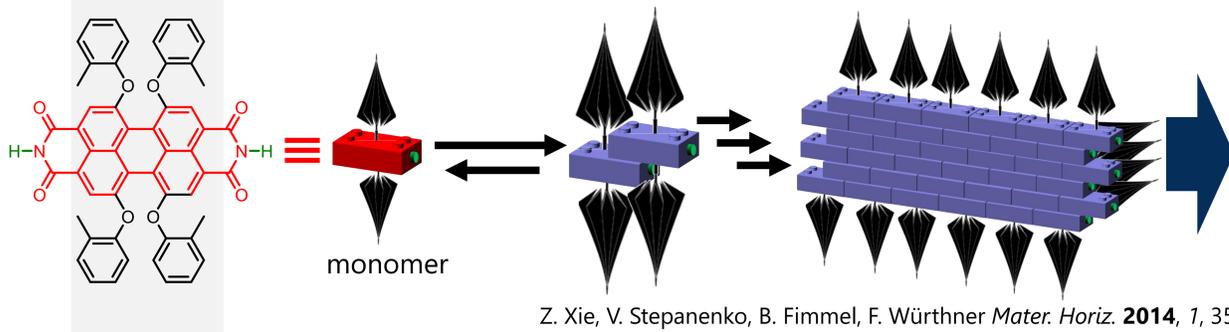


Hydrogen bonds

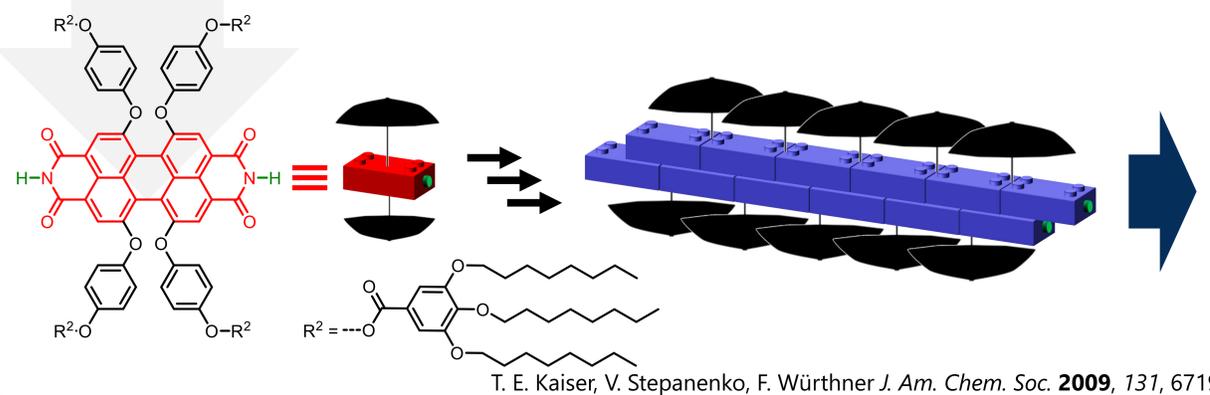
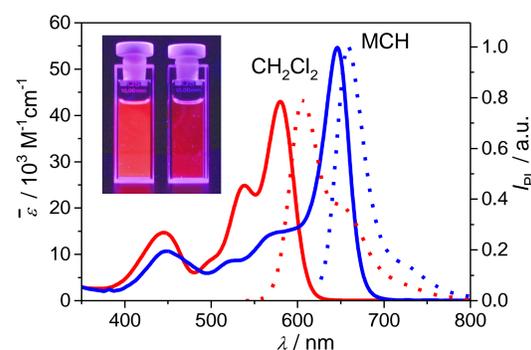
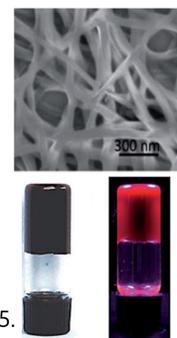
steric hindrance



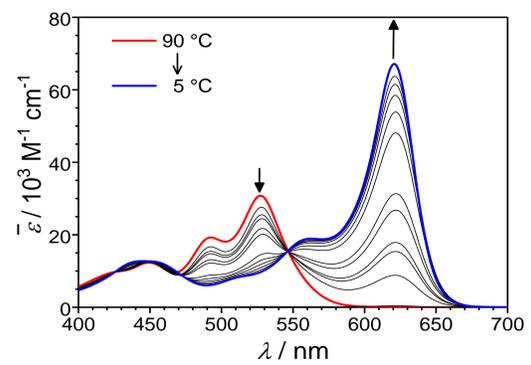
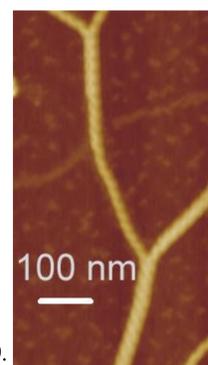
Industrial Organic Pigments, Wiley-VCH, Weinheim **2004**.



Z. Xie, V. Stepanenko, B. Fimmel, F. Würthner *Mater. Horiz.* **2014**, 1, 355.

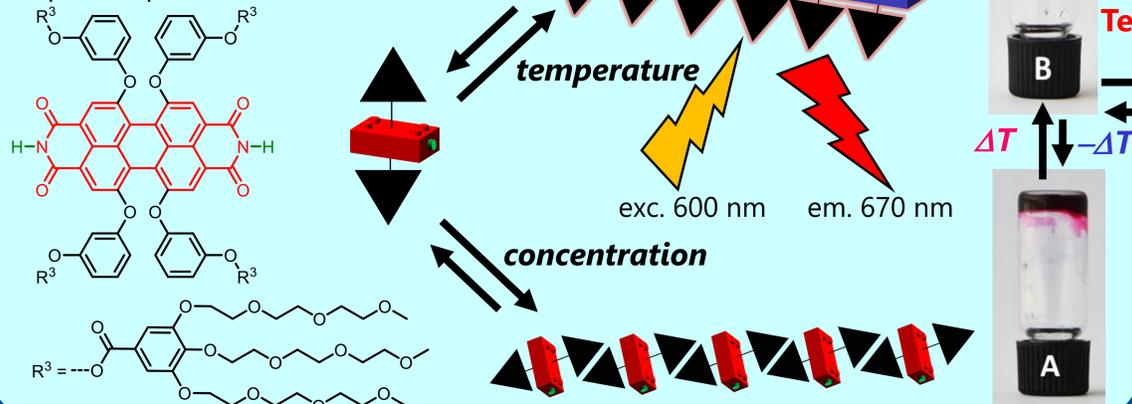


T. E. Kaiser, V. Stepanenko, F. Würthner *J. Am. Chem. Soc.* **2009**, 131, 6719.



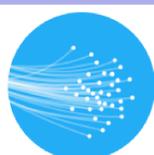
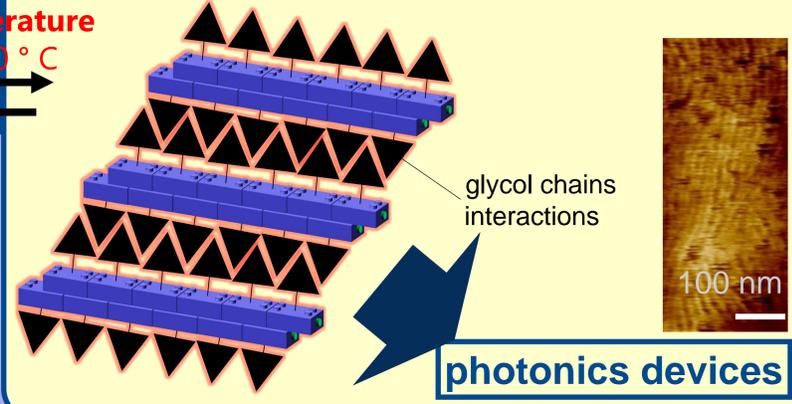
Interactions in water

In the SYNCHRONICS we finely tune the supramolecular forces by means of water, with the goal to build photoactive responsive processable materials.



Liquid Crystals

S. Herbst, B. Soberats, P. Leowanawat, M. Lehmann, F. Würthner *Angew. Chem., Int. Ed.* **2017**, 56, 2162
The induction of the liquid crystalline phase allowed us an higher-order control on the aggregation and to align the samples.



SYNCHRONICS

Supramolecularly Engineered Architectures for optoelectronics and photonics

