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Student Information

Name

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Thesis Summary

During my PhD I was working on the "Synthesis, Self-assembly and Photophysical Properties of Multichromophoric Systems". It was the task to arrange multichromophoric systems in precise architectures to tune their optical and enhance their photo-physical properties using the powerful tools of supramolecular chemistry, i.e. non-covalent interactions. I unraveled the complex interplay of different intermolecular interactions on the stacking behavior of pyrene chromophores and their influence on the resulting optical properties. On the basis of the obtained knowledge from this fundamental study I designed novel multichromophoric carbonyl-bridged triarylamine (CBT) trisamides, and confirmed energy transfer within these compounds. As the highlight of this thesis I demonstrated that these multichromophoric CBT derivatives can self-assemble into supramolecular nanofibers with molecular diameter and I achieved long-range excitation energy transport along these one-dimensional aggregates at room temperature over at least 4 μm , which corresponds to more than 10.000 molecules. This effect is explained by a strong coupling between the H-aggregated CBT chromophores which is a direct consequence of the molecular structure and the implemented supramolecular interactions. Consequently, by molecular design I was able to precisely arrange carbonyl-bridged triarylaminines to enhance the transport of excitation energy, a photo-physical process, which is crucial in light-harvesting systems. The obtained groundbreaking results which are published in Nature can pave the way towards new quantum computing and light-harvesting technologies.

Essay Submission

Please write a 1000-word essay describing your thesis work. No longer than 1000, please!

Please upload your 1000-word essay describing your thesis work.



Andreas Hadler essay IUPAC_SOLVAY_2016.pdf
957.62 KB

Figures

Academic Background

Institution Granting your PhD
University of Bayreuth

Date of PhD received
1/23/2015

Field of Study

Supramolecular Chemistry
Multichromophoric Systems

PhD Thesis Advisor

Prof. Dr. Hans-Werner Schmidt

Thesis Advisor Email Address

hans-werner.schmidt@uni-bayreuth.de

Academic Degree-2**Institution****Academic Degree-3****Institution****Thesis Title**

Synthesis, Self-Assembly and Photophysical Properties
of Multichromophoric Systems

Department

Macromolecular Chemistry I

Date Received**Field of Study****Date Received****Field of Study**

PhD Thesis Committee Members

Please list all members of your Thesis Committee along with their affiliation and current email address

Committee Member 1

Dr. Richard Hildner

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Department Affiliation

Experimental Physics 4

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Macromolecular Chemistry I

Phone**Committee Member 3**

Prof. Dr. Stephan Förster

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Physical Chemistry I

Phone

Academic and Professional Awards

Please list all awards received while a student

Received While a Student 1

Award Title

ERASMUS Fellowship

Award Date

10/2007

Award from Institution or Organization

European Union

Description of Award

Fellowship for a research stay at the Heriot-Watt
University Edinburgh for six months

Award Title

Fellowship of the Elite Network of Bavaria e.V.

Award Date

11/2010

Award from Institution or Organization

State of Bavria, Germany

Description of Award

Fellowship of the Elite Network of Bavaria e.V. within the "Bayerischen Eliteförderungsgesetz" (BayEFG) for 2 years

Award Title**Award Date****Award from Institution or Organization****Description of Award****Award Title****Award Date****Award from Institution or Organization****Description of Award****Award Title****Award Date****Award from Institution or Organization****Description of Award**

Selected Publications

Please provide reference to selected publications. Maximum is 8.

Item 1

List of 8 Selected Publications**Haedler et al. - Nature - 2015 - Long-range energy transport in single supramolecular nanofibres at room**
1.31 MB**Publication #1**A. T. Haedler, H. Misslitz, C. Buehlmeyer, R. Q. Albuquerque, A. Köhler, H.-W. Schmidt, „Controlling the p-Stacking Behavior of Pyrene Derivatives: Influence of H-Bonding and Steric Effects in Different States of Aggregation”, ChemPhysChem 2013
DOI: 10.1002/cphc.201300242.**Publication #2**A. T. Haedler, S. R. Beyer, N. Hammer, R. Hildner, M. Kivala, J. Köhler, H.-W. Schmidt, „Synthesis and Photophysical Properties of Multichromophoric Carbonyl-Bridged Triarylamines”, Chem. Eur. J. 2014
DOI: 10.1002/chem.201403667**Publication #3**A. T. Haedler, H. Misslitz, C. Buehlmeyer, R. Q. Albuquerque, A. Köhler, H.-W. Schmidt, „Controlling the p-Stacking Behavior of Pyrene Derivatives: Influence of H-Bonding and Steric Effects in Different States of Aggregation”, ChemPhysChem 2013
DOI: 10.1002/cphc.201300242.**Publication #4****Publication #5****Publication #6****Publication #7****Publication #8****I hereby affirm that the information contained in this application is accurate and complete to the best of my knowledge**

Yes

I hereby affirm that I have/will have received my PhD in 2015

Yes

Name and Affiliation

Andreas Haedler Groupleader BASF SE

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