Looking back over my career, I … would say that some detours were worth it. When I was eighteen I wanted to be … a chemistry student, however, first I had to spend one year in the army. If I were an animal … I would like to be an eagle. Chemistry is fun because … as a scientist and especially as a professor you can enjoy much greater freedom than in other professions and you are always surrounded by young and enthusiastic co-workers. The biggest challenge facing scientists is … to ensure a sustainable and environmentally friendly energy supply for a growing world population. Young people should study chemistry because … it is the science with which this biggest challenge for humankind can be solved in the coming decades. The most significant historic event of the past 100 years was … the unification of western and eastern Europe and the concomitant reunification of Germany. The most important future applications of my research are … hopefully not just a dream. My first experiment was … to smear my mother’s oven with shoe polish. My favorite quote is … “Choose a job you love, and you will never have to work a day in your life” (Confucius). I admire … my co-workers, when they persistently search for a solution despite numerous unsuccessful experiments. My favorite way to spend a holiday is … being in the mountains or at the ocean without a laptop or smartphone. My science “heroes” are … Emil Fischer and Theodor Förster. The most important thing I learned from my students is … that people and projects have to match. My favorite musician is … my wife.
How has your approach to chemistry research changed since the start of your career?

If you have conducted successful research, you are rewarded with a flow of high-quality co-workers. As a result, and in particular because of globally mobile postdoctoral candidates who can contribute their own complementary expertise, the ability to pursue new ideas is improved. Here, I think there is really a fundamental difference compared with the beginning of my career. At that time, this privilege was subject only to the top American universities and in Germany to the Max Planck Institutes. Today, interdisciplinary research can be conducted also at German Universities by shaping a research team with complementary expertise by the involvement of excellent foreign postdocs.

How do you think your field of research will evolve over the next 10 years?

Nowadays, more than in any other field of organic chemistry, the application of supramolecular principles belongs in the repertoire of preparative chemists working on the development of organic functional materials. I assume that this trend will continue and in particular, organic electronics and photovoltaics will become more “colorful” in the upcoming years. To make progress here and in other areas, self-organization processes will play an increasingly important role in designing complex multicomponent mixtures and bulk materials/solids with emergent applications. And of course, self-assembly processes should also be useful in water and finally in a biological milieu where the number of unknown parameters increases considerably!

My 5 top papers:


We examined the formation of extended aggregate structures of perylene bisimide dyes and thus opened a still very active research field. The extremely low solubility of these pigment chromophores was overcome by insertion of phenoxy substituents into the four bay positions. Subsequently, supramolecular polymers were formed by adding hydrogen-bonding dialkylamine derivatives. The resulting aggregates in solution and surface deposited mesoporous networks are characterized by exceptional fluorescence and exciton transport properties.


The thermodynamic stability of the dimer aggregates in dependence of structural parameters and the solvent polarity was analyzed and an interpretation of the aggregates’ absorption bands based on exciton theory was carried out. Based on the solvent dependency of the aggregation constants, the major contribution to the binding constant is the electrostatic attraction, which results from the antiparallel orientation of the dipole moments. This paper explains why merocyanines are less successful than expected in nonlinear-optical devices. It also explains why—much later, see Ref. [5]—merocyanine dyes can be successfully applied in solar cells.


Self-assembly of perylene bisimide dyes produced intensely fluorescent J-aggregates through a twist of the perylene scaffold and the influence of hydrogen bonds. As a result of the fluorescence quantum yield of almost 100 % and the instantaneous growth of these aggregates at a critical concentration (so-called nucleation elongation mechanism, proven in a subsequent paper), a multitude of further studies became possible, such as the determination of exciton diffusion lengths by means of single-molecule spectroscopy.


I have always been fascinated by the variety of functions cellular compartments and chloroplasts exhibit. With this paper, we were able—and this was scientifically unknown territory for us—to produce a kind of artificial liposome through the self-assembly of amphiphilic perylene dyes into a vesicular membrane, with internally solvated bispyrene-chromophores that functioned as a pH-probe via a pH-dependent FRET-process. It is fascinating how many interesting self-organized nanosystems based on new unconventional amphiphiles are being published at the moment, and it is an interesting question to ponder the possible applications of these systems in the life sciences.


The supramolecular chemist is often accused of creating beautiful structures that are useless. Here, the aggregation of dipolar merocyanines (see Ref. [2]) led to highly efficient bulk heterojunction solar cells, for which no expert in the field of organic electronics would have bet on functioning because of their unfavorable dipolarity. However, upon aggregation into centrosymmetric dimers the dipolarity vanishes on the supramolecular level and efficient charge and exciton transport becomes possible.

DOI: 10.1002/anie.201201949