university of groningen

Newsletter

Stratingh Institute for Chemistry

109

May 2015

Water Symposium in honour of Prof. Jan Engberts

On the 10th of April many members of the Stratingh Institute attended the Water Symposium in honour of Prof. Jan Engberts' 75th birthday. It was a memorable day for Jan who was visibly moved by the event. It was great to see so many people there, both current Stratingh members, former group members as well as colleagues from Jan, with whom he shares a long history. And all this happened 10 years after Jan formally retired! Events like this are common when people retire (indeed we had a splendid day then) but rarely happen another time 10 years later. The fact that the day was such a success is testimony to Jan's standing in- and continued involvement with the institute. As you know Jan comes in nearly every morning and is always excited about discovering a new gem in the literature. I hope that this may continue for many more years (and that we may share many more coffees together).
Apart from being a fantastic event from a social point of view, there was also some great Science, with inspiring and insightful talks from top scientists like Bert Meijer, Mischa Bonn (director Max Planck Institute Polymer Chemistry, Mainz), Philip Ball (science writer, author of the biography of water and former Nature editor). All in all a superb event and we all owe a lot to Ben Feringa and Tineke Kalter for organizing it so well!

Sijbren Otto

Highlights by Prof. dr. Jan B.F.N.Engberts

- Six Chinese scientists from two chemistry departments of Florida State University report that live cells can be used as carriers for drug-laden particulate structures and have unique advantages for controlled drug release.These microdevices feature a disklike shape, an asymmetric structure, the use of biodegradable thermoplastics as the major component material, with covalent bonds holding the component materials together. The novel microdevices hold potential to be further developed into clinically useful cell-borne drug-

delivery systems. *Xia, J., Wang, Z., Huang, D., Yan, Yan, Y., Li, Y., Guan, J., ACS Appl.Mater.Interfaces, 2015, 7, 6293-6299.*

- Houk and coworkers at UCLA performed a detailed theoretical study of the Diels-Alder reactions of cyclopentadiene, cyclohexadiene, and cycloheptadiene aimed at getting more detailed insights into the differences in reactivity. The results indicate that out-of-plane distortions across the C1C2 and C3C4 diene double bonds, required to achieve the transition state, play an important role. These effects are, as perhaps expected, smaller for highly asynchronous or stepwise reactions. *Jevandowski, B. J., Houk, K. N., J.Org.Chem. 2015, DOI 10.1021/acs.joc.5b00174.*

- The first total synthesis of the norlignan glucoside sinenside A has been accomplished in nine steps from readily accessible starting materials by two chemists from the CSIR-National Chemical Laboratory, in Puna, India. The compound, found in plants employed in folk medicine in China, contains a skeleton characterized by a unique cyclic disaccharide in which two pyranose residues are fused with a challenging 1,2-trans-configuration. The described synthetic approach is divergent in nature and might be usable for the synthesis of various analogues of sinenside A and other norlignans of the same family. *Vadhadiya, P.M., Ramana, C.V., Org.Lett. 2015, DOI 10.1021/acs.orglett.5b00505.*

- A fascinating MD study, carried out at the University of Chicago and in an IBM Research Center in New York, reported that a not previously described wetting mechanism can influence proton translocation in biological systems. They found that protons can create their own "water structure", in fact "water wires", in hydrophobic spaces (e.g. protein pores) before migrating through them. It is shown that before the proton enters a nanotube, it starts "shooting" water molecules into the otherwise dry space via Grotthuss shuttling, thereby effectively creating its own water wire where none existed before. The water wire can then function as the structure making proton translocation possible through nanoconfined hydrophobic spaces. *Peng, Y., Swanson, J.M.J., Kang, S-g., Zhou, R., Voth, G.A., J.Phys.Chem.B 2015, DOI 10.1021/jp5095118.*

- A one-page editorial in Nature Methods describes the complex difficulties involved in a fair and informative comparison of experimental methods. Is a method faster, brighter, more accurate, more specific, easier to use or implement, does it make compromises on some aspects of performance? Many methods in scientific work are rather complex and depend on several other experimental or computational steps in the overall approach. It is also argued that it is a serious problem to identify the contribution of a particular methodological development in comparisons of methods where more than one component of the method has changed. Continuous attention to these problems is necessary to help researchers in their choice of an experimental method that provides worth for their money, energy and time.....*Nature Methods, 2015, 12, 273.*

- Authors from the University of Valencia described a relatively simple vacuum deposition method for the production, by flash evaporation, of high quality hybrid organic-inorganic methylammonium lead iodide perovskite thin films. These materials were sandwiched in between organic charge transporting layers to afford homogeneous and highly crystalline thin films. The films have been tested in planar solar cells employing organic charge transport layers and power conversion efficiencies exceeding 12% have been achieved. Further more complicated applications are suggested in the communication. *Longo, G., Gil-Escrig, L., Degen M.J., Sessolo, M., Bolink, H.J., Chem.Comm., 2015, DOI 10.1039/c5cc01103e.*

- Piotr Nowak drew my attention to an interesting communication in Angew.Chem.Int.Ed.

Scientists from the UK, Pakistan and Sweden performed an MD and an experimental study in order to find out why and how crystal seeds are able to induce crystallization. This secondary nucleation is an important phenomenon both in the research laboratory and in industrial processes. It is argued that molecular aggregates are formed in solution, which on coming in contact with the surface of the seed undergo nucleation to form new crystallites. These are weakly bound to the crystal surface and can be readily sheared by fluid, thereby making the seed surfaces avalable again to repeat the process. Of course, the efficiency of this process depends on the strength and nature of the contact of the emerging crystallites with the crystal surface. The new crystallites can then in turn serve as seeds, so that crystallization can continue. *Anwar, J., Khan, s., Lindfors, L., Angew.Chem.Int.Ed. 2015, DOI 10.1002/anie.201501216.*

- A joint project of the Universities of Cambridge and Göttingen led to the discovery of a novel, unusual route for the synthesis of a chiral, cyclic [3]catenane, which consists of three mutually interprenetrating rings and which is, therefore, a most challenging synthetic target. First, five distinct building blocks self-assemble into a heteroleptic triangular framework composed of two joined circular helicates containing two Fe(II) circular helicates. Subcomponent exchange makes it then possible that specific points in the framework are linked together to generate the cyclic [3]catenane product. The successful preparation of the [3]catenane shows the power of selective imine exchange in the formation of mechanically interlocked structures. The authors suggest that their synthetic strategy may be used in the production of novel molecular devices with complex topologies. *Wood, C.S., Ronson, T.K., Belenguer, A.M., Holstein, J.J., Nature Chem., 2015, DOI 10.1038/nchem.2205.*

- The final reference this month is not to a paper but to a website. Water has been called ”Life’s Marix”, all life processes need water. The bodies of all living systems contain a high percentage of water. In the Atacama desert (largely in Chili), with places where was no rain for 400 hundred years, there is no life. Our understanding of the role and nature of water in the biological cell is still far from complete. The confinement of water in narrow spaces in the cell can alter the character of water to a large extent. If you are interested in this topic, I strongly recommend the blogspot, written by Phil Ball, called “water in biology”. He summarizes regularly the most important papers and provides critical comments, if appropriate. *http://waterinbiology.blogspot.nl*

Jan Engberts

PhD Defences

Monday, May 11th

@ 16:15 Thomas Pijper will defend his PhD thesis. **Title:** “Optically responsive switches. Understanding and improving photochromic properties”. **Promotores:** Prof. dr. B.L. Feringa, Prof. dr. B.J. van Wees, Prof. Dr. W.R. Browne

Stratingh lectures

Prof. Richard L. McCreery

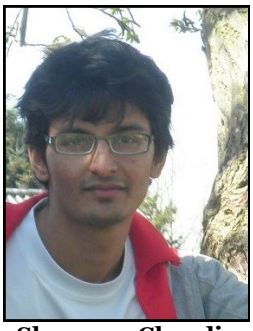
Department of Chemistry, University of Alberta

Day: Tuesday, May 12th, 2015

Room: 5111.0022

Time: 16:00

New appointments



Shreyans Chordia

1 April—**PhD**

Group Roelfes

Eswar Reddy Reddem

1 April—**PostDoc**

Group Roelfes

Werkbespreking: Thursday morning 8.30 hrs, room 5111.0080

May 7th—Francesco Lanza "Synthesis of Substituted Tetrahydroisoquinoline via Morita-Bailys-Hillman Reaction"

May 14th—ASCENSION DAY

May 21st—Liliana Cozzoli "Photoactivatable membrane channels based on Alamethicin"

May 28th—Nataliia Sukharevska "Mechanistic insights of catalytic enantioselective addition of enones to dihydroisoquinolines"

Jun 4th—Marco Wonink "Lowering the CO2/CO overpotential by Fe-Porphyrin/FLP combinations"

Jun 11th—WORKWEEK

If you have items for the next issue of this Newsletter, please send an e mail to the Stratingh Institute office: Stratingh@rug.nl