university of groningen

Newsletter

Stratingh Institute for Chemistry

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October 2016

Ben's greatest strength is bringing people together and inspiring them with his creativity and drive to try the untried. It's fantastic to see this attitude rewarded like this.

Syuzi Harutyunyan

My first impression of Ben, when I was a stagier student visiting Groningen for the first time in 1998, was that he was an exceptional person and scientist; he inspired me then to do photochemistry. Despite nearly 14 years working and publishing with Ben, he is still a wonder to me. Some people do great science through overcoming barriers - Ben stands apart; there are no barriers to his magination and passion.

Wesley Browne

Ben is such a warm and sharing colleague that his honor makes us all feel somehow like proud parents. But what I always have admired the most about him is

how he cannot contain his enthusiasm for chemistry; the instant you bring up an idea or mention a recent finding, his eyes light up like no one else I know. There is an transcendent innocence to Ben's ardor for science that is deeply inspiring.

Ryan Chiechi

You are the most wise person I have ever seen, really like your speech, simple but profound.

Zhuohua Sun

Ben Feringa has extraordinary creativity and energy with which he has put the nano world in motion; an important part of his success is that he is a very inspiring teacher and a magnet for talented young researchers. When talking to colleagues, he is able to stir towards a purpose in an extremely enthusisatic and convincing manner.

Jasper Knoester

Whereas Sybrandus Stratingh built his electromagnetic motor, in Groningen in 1830, Ben Feringa reported on his molecular motor in 1999. Imagine what we are up to!

Adri Minnaard

Prof Ben Feringa enthusiasm for fundamental science and his creativity are an inspiration both the students and for the colleagues.

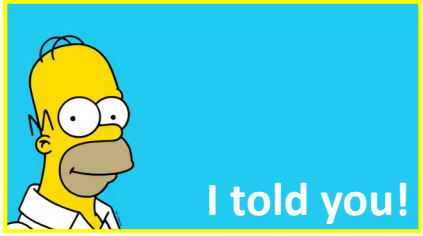
Martin Witte

Ben Feringa is an inspiring teacher who insists on teaching courses to first and second year bachelor students because he loves to share his passion for chemistry with them. In this, he is an example for all of us. A quote from Ben that he often used during the time of my PhD (in the 1990's, before he was a big star) is: "we want to play in the Champions League" - he used that to tell us that we needed to be ambitious.

Gerard Roelfes

Fantastic for the Stratingh Institute for Chemistry! Young talent thoughout the world will want to work here as researcher.

Kees Hummelen



The 2016 Best Presentation Award in Medicinal Chemistry, FIGON Dutch Medicines Days

Yagiz Unver, a PHD student of Prof. Anna Hirsch, attended the 18th edition of FIGON Dutch Medicines Days, 3rd- 5th October, 2016 Ede. The FIGON Dutch Medicines Days are a unique opportunity for everyone interested in drug development to update their knowledge on a wide range of topics. He presented his work titled as ``expanding the toolbox of protein-templated reactions for hit identification`` and won the 2016 best presentation award in medicinal chemistry. He will represent the Netherlands in oral talk competition at EFMC-YMCS 2017 conference.

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

- Neon is the fifth most abundant element in the atmosphere, but nevertheless the element has sofar never been observed in an organic or metal-organic environment. Crystallographers at the Universities of Cambridge, Rutgers and Argonne have now captured neon in a metal-organic framework (MOF) and not only that, they found a direct interaction between neon and a transition metal (Ni). Evidence is provided by the Ni-Ne distance at both 100 K and 200 K which is smaller than the sum of the van der Waals radii of Ni and Ne. It is suggested that the results might indicate that there could be a potential to design an MOF for selective neon adsorption over other gases. *Wood, P.A., Sarjeant, A. A., Yakovenko, A. A., Ward, S. C., Groom, CR., Chem.Comm. 2016,5Z 10048-1005.*
- Tubulysins are a family of natural tetrapeptides with an important anticancer activity. Wipf and coworkers at Pittsburgh University and at Eli Lilly and Company have reported a total synthesis of the very potent antimitotic agent N14-desacetoxytubulsin H (1) as well as nine analogues. The synthetic procedure contains several highlights as, for example, an efficient late-stage functionalization leading to the synthesis of novel side-chain- and backbone-modified analogues of (1). A range of about four orders of magnitude in biological activity was observed, again illustrating the potential of natural product synthesis and the study of synthetic analogues. *Colombo, R., Wang, Z., Han, I., Balachandran, R., Daghestani, H. N., Camarco, D.P., Vogt, A., Day, B. W., Mendel, D., Wipf, P., J. Org. Chem., 2016, DOl 10.1021/acs.joc.6b01314.*
- Studer and a coworker at the University in Münster, Germany, synthesized tertiary Na-a Icoholates in reasonable to good yields by transition-metal-free C-C bond formation of Na-ketyl radical anions with a variety of aryl and heteroaryl iodides. Thermal reverse pinacol coupling of the corresponding Na-pinacolates generated the intermediate ketyl radical anions. Deprotonation of the pinacols could be best carried out by using NaH. C-C bond formation is suggested to take place via homolytic aromatic ipso-substitution with the iodine atom acting as a radical leaving group. Free aryl radicals are not involved in these transformations. The tertiary alcohols can be formed in the last step by protonation. *Tang, X., Studer, A., Org.Lett., 2016, DOI 10.1021/ocs.orglett.6b02184.*
- Meyer, at the University of North Carolina at Chapel Hill, and two coworkers at Chapel Hill and at the University of Gyeongsan in the Republic of Korea, reported a novel chemical

strategy for dye-sensitized solar energy conversion based on molecular excited states and electron acceptors/donors on the surfaces of transparent conducting oxide nanoparticle electrodes. They propose a relatively simple toolkit of molecular components for the preparation of both photoa node and photocathode assemblies. Redox-separated lifetimes on the order of milliseconds to seconds have been achieved. These long redox-separated lifetimes possess the advantage that more time is available for useful work to be extracted from the absorbed photon energy. *Farnum, B.H., Wee, K-R., Meyer, 711., Nature Chem. 2016, 8, 845-852.7r*

- Chemists at the University of Mohanpur, India, have published a rational design for the preparation of supramolecular shape synthons, i.e. mechanically flexible organic crystals that possess weak interactions between repeating building blocks in their structures.Their approach makes it possible to control the mechanical properties of ordered organic materials, as exemplified by high performance mechanical actuators, transistors, solar cells, photonics, bioelectronics and additives to ease pharmaceutical manufactoring. Several classes of such molecules have been investigated which contain active slip planes in their structures via different noninterfering supramolecular weak interactions such as van der Waals, it-stacking, hydrogen-bonding and hydrophobic interactions. These studies have demonstrated a clear potential of soft interactions for tuning the mechanical behavior of ordered molecular materials. The paper has been reviewed by Fellet. *Krishna, G.R., Devarapalli, R., Lal, G., Reddy, CM., J.Am.Chem.Soc., 2016, DOl 10.1021/jacs.6b05118. Fe/let, M., Chem. Eng. News, August 16, 2016.*
- A feature article in Chem.Comm., written by Vidal-Ferran and two colleagues, highlights recent advances in the synthesis of supramolecularly fine-regulated enantioselective catalysts. Supramolecular strategies are discussed to generate sets of enantiopure ligands (or enantioselective catalysts) which retain most of the backbone's structural features but at the same time incorporate subtle changes at its active site that depend on the structural characteristics of the regulation agent that is used. Two types of such catalytic systems are considered in particular detail . In one of them the regulation agent is attached to the unit that contains the catalytic site by a highly efficient and precise hydrogen-bonding-mediated assembly process. Interestingly, the approaches combine concepts from supramolecular chemistry, physical-organic chemistry and enantioselective catalysis. It is suggested that the near future will witness several novel examples the approaches described in the manuscript. *Vaquero, M., Rovira, L., Vidal-Ferran, A., Chem.Comm., 2016, DOI 10.1039/c6cc04474c.*
- (+)-Ryanodol is a diterpenoid with a complex structure that can modulate several important biological functions. The molecule, containing a number of highly oxidized rings, has previously been synthesized at Tokyo University in 35 steps.The synthesis has now been dramatically improved at CalTech, Pasadena, starting from the commercially available terpene (S)-pulegone, and involving only 15 steps. The efficiency of the synthesis derives from the use of a Pauson-Khand reaction to prepare the carbon framework and a selenium dioxide-mediated oxidation to install three oxygen atoms in a single step. The highly strategic design received already many comments, including one by Jeffrey Johnson (University of Carolina) who said: "To cut the step count by more than half on such a challenging target is rare, exciting, and enabling". *Chuang, K.V., Xu, C., Reisman, S.E., Science 2016, 353, 912-916.*
- It has been claimed by David Stuart (University of Oxford) and colleagues that cryo-electron microscopy (cryo-EM) resides in a time of "resolution revolution", that means that recently the

enormous development of hardware and software made it possible to resolve atomic structures with a greatly increased resolution. One of the recent examples is the structure of a human cytoplasmic actomyosin complex obtained using cryo-EM at an average resolution of 3.9 Å by von der Ecken and coworkers from German and American research institutes (Marc Stuart told me that the "world record" is at the moment 2.2 Å). This result makes it possible to discuss the general mechanism of myosin binding to F-actin, which is a central feature of muscle contraction. It will be clear, however, that these modern cryo-EM facilities bring great costs and, therefore, David Stuart proposes "democratization" of cryo-EM. A number of possibilities are possible, one of them is the creation of an international network of cryo-EM centers with one cutting-edge cryo-EM facility.This might also stimulate cooperation in basic and applied science, and facilitate the interpretation of the cryo-EM results.The latter feature is certainly a challenge as recently clearly demonstrated by Marc Stuart in our Institute. *Stuart, D.I., Subramaniam, S., Abresda, N.G. A., Nature Methods,2016, 13, 607-608. Von der Ecken, J., Helssler, S.M., Pathan-Chhatbar, S., Manstein, D.J., Raunser, S., Nature 2016, DOI 10.1038/ nature18295.*

Jan Engberts

New Appointments

Johannes Ottelé

As of 1/8/2016

PhD student

Group Otto

Stella Verkhnyatskaya

As of 1/9/2016

PhD student

Group Walvoort

Selim Sami

As of 1/9/2016

PhD student

Group Hummelen

Robin Gierse

As of 1/9/2016

PhD student

Group Hummelen

PhD Defences

Friday, October 14th

@ 16:15 Jiawei Rong will defend his PhD thesis. Title: "Copper Catalyzed Asymmetric Additions of Grignard Reagents to Ketones and Ketimines". Promotor: Prof. dr. S.R Harutyunyan

Friday October 28th

@ 14:30 Francesco Mecozzi will defend his PhD thesis. Title: "Selective Oxidation Catalysis with Mn and H_2O_2—Conversion of alkenes to α-hydroxy ketones, C=C cleavage and mechanistic insights". Promotor: Prof. dr. W.R. Browne

Werkbespreking: Thursday morning 8.30 hrs, room 5111.0080

October 13th— Xingchen Yan (PhD Harutyunyan): "Lewis acid promoted synthesis of chiral amides"

October 20th—Tjalling Canrinus (PhD Browne): "Remarkable solvent isotope dependence on gelation strength in low molecular weight hydro-gelators"

October 27th—Gongbao Wang (PhD Minnaard): "Study of the Nickel-Catalyzed Double SN2' Reaction of 1,6-Dichlorohexa-2,4-diyne"

November 3rd— Manuela Bersellini (PhD Roelfes): "Controlling protein activity through artificial allostery"

November 10th— Diederik Roke (PhD Feringa): "A molecular motor - diarylethene switch hybrid"

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

Photo of Ben Feringa on the front page downloaded from: http://www.bnr.nl/nieuws/wetenschap/10311739/nobelprijs-scheikunde-gewonnen-door-ben-feringa on 7/10/2016