university of groningen

Newsletter

Stratingh Institute for Chemistry

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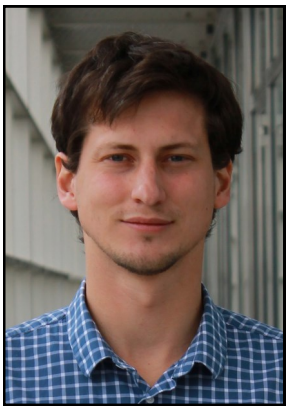
Veni Grant for Clemens Mayer



Fifteen researchers of the University of Groningen and the UMCG have been awarded a Veni grant by the Netherlands Organisation for Scientific Research (NWO). Five of them are researcher at the Faculty of Science of Engineering.

The NWO has awarded a Veni grant worth up to 250,000 euros to 154 researchers nationwide who have recently obtained their doctorate. The Veni grant provides highly promising young scientists with the opportunity to further elaborate their own ideas during a period of three years. The Veni is awarded by the NWO every year. A total of 1,127 researchers submitted an admissible research project for funding. 154 of these have now been granted nationwide.

Clemens project title is: Coupling reprogrammed translation with enzyme engineering

Enzymes are the most sophisticated catalysts known to mankind. Harnessing their prowess for industrial applications is an enticing prospect, yet enzymes are seldom optimal for abiological tasks. Here, the researcher will explore new strategies to tailor enzymatic activities inside bacterial hosts and evaluate their potential for creating madeto-order biocatalysts.

Mira Holzheimer is awarded poster prize at HRSMC Organic Synthesis Summerschool

Mira Holzheimer poster titled: "Asymmetric total synthesis of the mycobacterial glycolipid DAT2a and its non-natural analogue thio-DAT2a" won the poster prize of the HRSMC (Holland Research School for Molecular Chemistry) Organic Synthesis Summerschool. The summer school took place in Kasteel Vaeshartelt (Maastricht) from 10-13 July and was mainly focused on synthetic organic chemistry (methodology and natural product synthesis). More information about the event can be found clicking here.

Strating Award for the best-written colloquium of 2016

On Thursday June 29th, the winner of the Strating Award for the best-written colloquium of 2016 was announced. After an introduction on the history of this prestigious prize by Prof Gerard Roelfes, the three nominees that were selected by the selection committee were announced. The committee, consisting of 3 staff members (Marthe Walvoort, Kees Hummelen and Martin Witte) and 2 PhD students (Ranajit Mondol and Ivana Maric), ranked the 15 colloquia on criteria like critical analysis and clarity of writing.

The prize for the third place went to Alexander Wolters with his colloquium entitled " The use of homogeneous catalysis employing the Ruthenium Triphos complex for the utilization of CO2 as a C1 building block " . The runner up of this year's Strating Award was Lianne Jansen, with the colloquium entitled " Chemical opportunities for energy storage " . The winner of this year's Strating Award is Iwan Esser, with the colloquium entitled "Recent advances towards the sustainable catalytic synthesis of pyrroles". The colloquium successfully captured the most important examples in the field. It was clearly written and the selection committee found it a joy to read. The award ceremony was followed by coffee and cake for the members of the Stratingh Institute and a lunch for the members of the H.J. Backer foundation, the selection committee and of course the winner of the Strating prize.

Green Chemistry Emerging Investigators 2017 themed issue features Katalin Barta

The Stratingh Institute is proud to announce that Katalin Barta, recently appointed Associate professor, features in the first Green Chemistry Emerging Investigators 2017 themed issue!

This issue highlights the excellent research being undertaken by the rising stars of the green chemistry field from across the globe. All contributors were nominated by a member of the Green Chemistry Editorial or Advisory Board as an outstanding researcher in the early stages of their independent career, making a significant contribution to the advancement of green chemistry. Their profiles are shown here. We would like congratulate them all on being featured, and wish them every success in their future research and careers.

Feringa Academic Alumni Symposium, Chemistry for the Future

On September 14th and 15th the Stratingh Institute hosts a special symposium - "Feringa Academic Alumni Symposium, Chemistry for the Future"- that brings together Prof. Feringa former group members that are in academia, in order to celebrate the Ben's legacy and achievements.

All staff, postdocs, PhD's and students at the institute are invited to attend the symposium, during which the former group members give short presentations about their current research.

The lectures will take place in room 5111.0022, while egistration and coffee breaks will be in the reception hall of Nijenborgh 4.

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

I hope my readers had a nice and relaxing summer holiday!

- A novel and important novel function has been detected for adenosine triphosphate (ATP). It is well known that ATP has a well-characterized role in providing Gibbs energy for biochemical reactions within cells, but now Patel at the Max-Planck Institute for Cell Biology and Genetics in Dresden with six coworkers (one of them at the University of Chicago) have reported in a Science paper that the compound is also able to enhance protein solubility and influence protein aggregation, thereby acting as a hydrotrope. These results further stress the highly important role of ATP in evolution. Patel, A., Malinovska, L., Saha, S., Wang, J., Alberti, S., Krishnan, Y., Hyman, A., Science, 2017, DOI 10.1126/science.aaf6846.

- In a second Science paper, Feringa and colleagues described locked synchronous rotor motion in a molecular motor. In this molecular motor light-driven unidirectional rotary motion is translated to controlled movement of a connected biaryl rotor. The coupled motion of the distinct parts of the multicomponent mechanical system needs a precise control of the multiple kinetic barriers for isomerization and synchronous motion leading to sliding and rotation during a full rotary cycle, with the motor always facing the same face of the rotor. These results establish an important step forward in achieving more complex synchronized motion in an assembly of molecular machines. Stacko, P., Kistemaker, J.C.M., van Leeuwen, T., Chang, M-C., Otten, E., Feringa, B.L., Science 2017, 356, 964 -966.

- Watson, at the University of Delaware, Newark, reported a mild, nickel-catalyzed method for C-alkylation of nitroalkanes with unactivated alkyl iodides. In the past C-alkylation of nitroalkanes has been challenging because of competing O-alkylation and formation of carbonyl byproducts. Using commercially available catalysts, the new method can be applied to primary, secondary, and tertiary alkyl iodides. The exceptional functional group tolerance and the rapid access to complex nitroalkanes are further advantages of the novel method. Rezazadeh, S., Devannah, V., Watson, D.A., J.Am.Chem.Soc., 2017, DOI 10.1021/jacs.7b04312.

- Chemists from the Universities of Ottawa, Grenoble, York, and Ames published the first observation of CH…π interactions between methyl and carbonyl groups in proteins. Evidence is provided by the observation and measurement of long-range “through-space” scalar J couplings between methyl and back-bone carbonyl groups in proteins. The authors claim that the interactions resemble hydrogen-bond interactions involving the amide π network. The interactions are weaker than canonical hydrogen bonds, but nevertheless they are present in many proteins and are expected to make an cumulative contribution to the structure, dynamics, and biological function of a protein. Perras, F.A., Marion, D., Boisbouvier, J., Bryce, D.L., Plevin, M.J., Angew. Chem.Int.Ed. 2017, DOI 10.1002/anie.201702626.

- The oxygen-induced degradation of perovskite solar cells was studied by chemists from Imperial College London and The University of Bath, UK. Since methylammonium lead halide perovskites are such promising materials for solar cells, their physical and chemical long-term stability need serious attention. The films based on CH3NH3PbI3 are rapidly degradated when exposed to oxygen and light. Both experimental and computational techniques gave mechanistic insights into the photo-induced formation of highly reactive superoxide compounds, apparently via iodide defects in the CH3NH3PbI3 structure. It was found that iodide salt treatment can be used to reduce the number of problematic iodide vacancies, thereby hindering the electron transfer that generates superoxide species. The results are of immediate importance for the future design and optimization of stable perovskite solar cells. Aristidou, N., Sanchez-Molina, I., Bu, X., Kosco, J., Haque, S.A., Eames, C., Islam, S., Nature Comm., 2017, DOI 10.1038/ncomms15218.

- Roald Hoffmann, (Cornell University) and three coworkers from Universities in Canada and Jordan, published an important contribution to the ungoing discussion about the structure and preparation of iodabenzene, a benzene molecule in which one CH group is replaced by I. If this molecule would be planar, it would be antiaromatic, containing 8 π electrons, a situation that has to be best avoided. This could be accomplished by an out-of-plane distortion to a “bird-like” geometry, a structure resembling a Meisenheimer complex, such as (CH)5CH2-. Stabilization could be possible by putting π-accepting nitro substituents in the ortho and para positions where the negative charge largely accumulates. Theoretical data show that this trinitro derivative is indeed quite substantially stabilized, which makes the authors optimistic about the experimental realization and even isolation of the “bird-like” iodabenzene isomer. Rawashdeh, A.M., Prambil, P.C., Zeng, T., Hoffmann, R., J.Am.Chem.Soc. 2017, DOI 10.1021/jacs.7b03388.

- Thisbe Lindhorst (Otto Diels-Institute for Organic Chemistry, Kiel, Germany) has written an interesting Editorial

in Angew.Chem.Int.Ed. with the title “Chemistry has a Commitment to Life”. She is asking the question “Can we use chemistry to lead to a better future for everyone?“ Her answer is “yes”. Professional chemists should work together with other experts to become architecs for the future. Chemistry must serve life and must not harm living beings on earth. There should be an awareness about the consequences of our discoveries and creations, as well as a great deal of selfreflection. “System thinking” should become a part of our education in chemistry. She concludes that the use of our knowledge in this spirit is the price for a thriving future and will also be our reward. Lindhorst, T.K., Angew.Chem.Int.Ed.2017, DOI 10.1002/anie.201707088.

- Researchers at Eindhoven University, Queen’s University, Kingston, Canada and the Hebrew University at Jerusalem established a world record (or close to it) by reconstructing a 600-nm-long protein. Most folded proteins are 2-15 nμ long. It is a M.primoryensis ice-binding protein (MpIBP), a so-called adhesion protein. The single protein chain of MpIBP has five regions, called RI, RII, RIII, RIV and RV which have been analyzed by X-ray crystallography, NMR and small-angle X-ray scattering. The protein is expressed on the surface of a Marinomonas primoryensis that lives in waters in and around Antarctica. The different functions of the five regions have been elucidated, with RIV being responsible for binding to ice. This binding process is similar to how pathogenic bacteria attach to our cells. The new insights obtained in this work may help to understand a variety of protein functions, and are relevant for developing a new way to block human bacterial infections. Guo, S., Stevens, C.A., Vance, T.D.R., Olijve, L.L.C., Graham, L.A., Campbell, R.L., Yazdi, S.R., Escobedo, C., Bar-Dolev, M., Yashunsky, V., Braslavsky, I., Langelaan, D.N., Smith, S.P., Allingham, J.S., Voets, I.K., Davis, P.L., Science Adv., 2017, DOI 10.1126/sciadv.1701440.
- One of the puzzling problems in enzymic reactions is the origin of the non-Arrhenius behavior of the rate constant for hydride transfer reactions, as, for example, in alcohol dehydrogenase (ADH). A number of explanations has been suggested, including a change in reaction mechanism by temperature, but these possibilities have not been confirmed by later evidence. Warshel, with a colleague at the University of Southern California at Los Angeles, and one coworker from Astex Pharmaceuticals at Cambridge, UK, have now shown that the non-Arrhenius features are not so surprising for reactions in complex environments. An important role is played by the temperature dependence of the rearrangements of the polar protein groups in response to the change in charge distribution of the reacting system during the transition from the ground state to the transition state. Or, stated briefly, the temperature dependence of the entropy is the main reason for the non-Arrhenius trend in catalysis by ADH. It was also found that quantum effects reflect in part thetemperature dependence of the donor-acceptor distance.Roy, S., Schopf, P., Washel, A., J.Phys.Chem.B 2017, DOI 10.1021/acs.jpcb.7b03698.
- I asked quite a number of people: “Can you taste water?” Most of them replied: “No”. But now scientists from the California Institute of Technology, Pasadena and the University Hospital in Duisburg made a detailed study of the cellular mechanism forwater detection in the mammalian taste system and the results showed that the reply has to be “Yes”. It was argued that if water is sensed as taste, at least two criteria should be met. First, taste responses to water should be mediated by specific cellular and molecular substrates in the taste bud, and, second, activation of this pathway should encode a cue for external water. Indeed, the acid-sensing taste receptor cells, previously suggested to be the sour taste sensors, also mediate taste response to water. The data obtained in this study showed a function of mammalian acid-sensing tastereceptor cells that provides a cue for external water. Zocchi, D., Wennemuth, G., Oka, Y., Nature Neuroscience 2017, DOI 10.1038/nn.4575.

Jan Engberts

New Appointments

Ruth Dorel Bruscas

PostDoc—group Feringa

1/7/2017

PhD defences

Friday, September 15th

@ 14:30 **Oleg Kozlov** will defend his PhD thesis. Title: “Plastic solar cells: where the current begins - Ultrafast exciton -to-charge conversion in organic photovoltaics”. Promotor: Prof. dr. J.C. Hummelen, Co-promotor: Dr. M.S. Pchenitchnikov

Monday, September 18th

@ 12:45 **Tao Yan** will defend his PhD thesis. Title: “Carbon-nitrogen bond formation via catalytic alcohol activation”. Promotores: Prof. dr. B.L. Feringa, Prof. Dr. K. Barta

Monday, September 25th

@ 16:15 **Muhammet Yağiz Ünver** will defend his PhD thesis. Title: “Expanding the toolbox of protein-templated reactions for early drug discovery”. Promotores: Prof. dr. A.K.H. Hirsch, Prof. dr. B.L. Feringa

Friday, September 29th

@ 11:00 **Boris Bartolec** will defend his PhD thesis. Title: “Compartment formation and self-reproduction in dynamic combinatorial libraries”. Promotor: Prof. dr. S. Otto

Werkbespreking: Thursday morning 8.30 hrs, room 5111.0080

September 7th — Ruth Dorel Bruscas (post-doc Feringa) - “Gold Catalysis for the synthesis of Hydroacenes: New precursors of higher acenes”

September 14th (Will take place in 5111.0022) — Jonas Lohse (PhD Witte) - “Selectively Modifying Proteins With Targeted Diazotransfer Reagents”

September 28th—Viktor Ivasyhyn (PhD Chiechi) - "Synthesis of Hominal Bis(gem-CF2) Fragment"

October 5th—Kaja Sitkowska (PhD Feringa) - "Towards uncaging amines with red light"

October 12th—Yanxi Zhang (PhD Chiechi) - "Gating and Conjugation in Nano-gap Tunneling Junctions"

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