

## Conference Call

Eleven plenary lectures, four short courses, and 50 invited lectures were delivered. Towards the end of the conference a Hot Topics in Catalysis Session was led by Professors Beller and Maes. There was a poster session that attracted 60 posters and a small exposition at which publishers, chemical manufacturers, and scientific instrument companies exhibited. Two hundred delegates from over thirty countries attended the conference.

The plenary lectures were given by: Mathias Beller, University of Rostock, Germany, Catalysis: A Key Technology for Sustainable Synthesis; Carolyn R. Bertozzi, UC Berkeley, USA, In vivo Chemistry; Jonathan Clayden, University of Manchester, UK, Asymmetric Arylation and Vinylation of Carbanions; Peter J. Dunn, Pfizer, UK, Green Heterocyclic Chemistry; Paul Feldman, Glaxo-SmithKline, USA, Organic Chemistry Aiding Medicinal Chemistry Advances; Stephen Hanessian, University of Montreal, PQ, Canada, Exploring the Unique Reactivities of Heterobicyclic Tetrazoles - Access to Functionally Diverse and Versatile Heterocyclic Scaffolds; Sebastien Lemaire, Janssen Pharmaceutica, Belgium, Stereoselective C-Glycosylation Reactions with Arylzinc Reagents; Erik J. Sorensen, Princeton University, USA, Taking Risks in Complex Synthesis Design; Jim Thomas, University of Manchester, UK, Approaches to the Synthesis of Some Biologically Active Compounds; M. Christina White, University of Illinois, USA, Site Selective C-H Oxidation; Tony Wood, Worldwide Medicinal Chemistry, Pfizer, USA, Heterocycles and Medicinal Chemistry: The importance of Innovative Synthesis.

Invited lectures were given by: H. Amri (Tunisia), M. Azam (Saudi Arabia), R. Bavantula (India), P. Belmonte (France), E. Biehl (USA), U. Braendli (Switzerland), K. Campos (USA), A. Campbell (USA), J. Christensen (Denmark), C. Chung (USA), F. Cossio (Spain), N. Downer-Riley (Jamaica), G. Dudley (USA), P. Erhardt (USA), S. Florio (Italy), M. Francisco (USA), R. Hanes (USA), F. Hansen (Germany), H. Ihmels (Germany), Y. Iwabuchi (Japan), Y. Jackson (Jamaica), R. Kargbo (USA), D. Ketcha (USA), J. Kocevar (Poland), S. Kotha (India), S. Kumar (India), M. Laksman (USA), J. Madelengoita (USA), V. Mamedov (Russia), A. Mattson (USA), C. Meyer (France), V. Milata (Slovakia), T. Moss (UK), A. Nefzi (USA), D. Oniciu (France), R. Orru (Netherlands), D. Otte (Germany), S. Parumal (India), V. Patil (India), N. Peet (USA), Z. Pei (USA), H. Sintim (USA), J. Soloduchko (Poland), J. Svete (Czech Republic), K. Tanaka (Japan), W. van Otterlo (South Africa), A. Verma (India), D. Virieux (France), C. Williams (Australia), B. Zajc (USA).

The next Florida Heterocyclic and Synthetic Con-

ference, FloHet-2015, will take place at the University of Florida, Gainesville, March 1-4, 2015. The Katritzky Memorial Lecture will be given by Albert Padwa, Emory University, USA. Plenary lecturers will include, Huw Davies, Emory University, USA; Veronique Gouverneur, Oxford University, UK; Timothy Jamison, MIT, USA; Peter Maienfisch, Syngenta, Switzerland; Christel Menet, Galapagos, Belgium; Tobias Ritter, Harvard University, USA; Paul Scola, BMS, USA; Jay Siegel, Tianjin University, PRC; Oliver Thiel, Amgen, USA; Yoshinori Yamamoto, Tohoku University, Japan. The short course entitled: Selective Direct Fluorination Strategies: Batch and Flow will be given by Graham Sandford, University of Durham, UK.

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## Nanomaterials and Human Health: The Trends and Future

by *Vladimir Gubala*

A workshop was held 15-16 September 2014, as a joint venture of the IUPAC Chemistry and Human Health Division (Div VII) and the University of Kent. The workshop received support from the Peptide Research Network of Excellence (PeReNE). 37 participants from 9 countries (Ukraine, Slovakia, Italy, France, Germany, Spain, Ireland, England, and Egypt) attended the symposium. There were 17 oral presentations, with poster sessions in the breaks.

After a welcome and the introduction of IUPAC and the University of Kent by Dr. Vladimir Gubala, 17 talks and 15 posters were presented. This included a poster dedicated to IUPAC, highlighting the main goals of IUPAC and specific contributions of the Division VII, and in particular two ongoing IUPAC projects: 2013-007-1-700 and 2010-051-1-700. Both deal with various aspects of nanomaterial preparation and advances in immunochemistry and their applications to human health.

The speakers presented original research work on a wide range of potential theranostic applications of nanoparticles. These included gas-filled nanobubbles that improve ultrasound signals of blood vessel walls, specific nanoparticles targeted to diseased tissues or across natural barriers (such as the blood-brain barrier), and specific signal transduction into lymphocytes. There is a clear need for more specific therapy and diagnosis (theranostics) for many diseases, notably for very aggressive tumours where known pathogenesis

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factors should allow a targeted approach (e.g. glioblastoma). It is believed that nanoparticles are specifically well suited to carry poorly water-soluble agents to the tissue.

In general, three main scientific approaches related to the development of new nanomaterials were presented:

1. to visualize and to follow nanomaterials in vivo, for instance in cells and tissues;
2. as high brightness tags for biomedical diagnostics; and
3. as nanocarriers for drug delivery.

At a glance, all the presentations were of outstanding scientific levels ('quality' of the science, pertinence of the different topics presented, and strong informative purpose). All the questions were appropriate and fit well with the corresponding talk—the answers were focused and precisely related to the question.

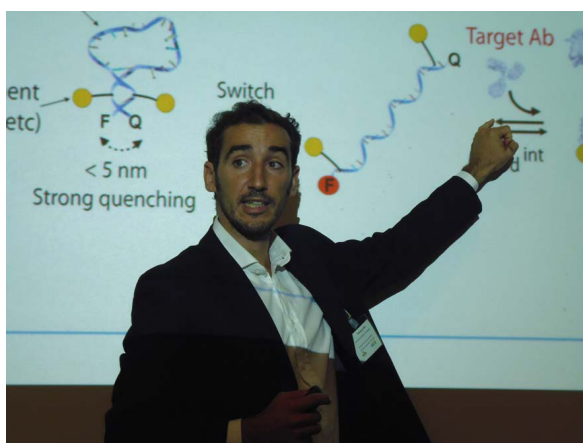
Several talks were dedicated to strategy for the development of start-ups. Theranostic nanoparticle constructs tend to become increasingly complex. Chemistry plays a central role in this development. Some general rules for a suitable architecture have evolved and they were discussed:

1. the scaffold in the center is usually a metal, polymer or other entity (gold, silica, polyacryl, phospholipid and many others such as smart DNA nanoboxes);
2. it will usually be loaded with the desired therapeutic or diagnostic agent; and
3. various functionalities for molecular recognition are added to the surface that allow target organ recognition and/or response to externally applied signals.

Opinion on the surface treatment of nanomaterials used in human health-related applications made it a much-discussed topic during the breaks. The generally accepted strategies resolve around post-synthetic chemical treatment of the nanomaterials in a way that will inhibit unwanted formation of a protein-corona and suppress nanoparticle aggregation and non-specific binding. Specific to drug-delivery applications, it is desirable to increase the circulation time of the nanocarriers in the blood stream, thus increasing the probability of collisions of the engineered nanomaterial and the target cells.

In most of the presented research work, the synthesized and characterized nanoparticle constructs

were added to cellular systems to obtain information about interactions such as cellular uptake or other biochemical responses. Such in vitro studies provide important information about the potential efficiency of specific approaches. At present, there is a general lack of information about the behaviour and unwanted effects that would occur in the whole organism. Rates and extent of phagocytosis, degradation, aggregation, corona formation, renal clearance and elimination via urine, backflow from target cells, etc. can only be estimated. Even in cases where the risk of acute unwanted effects can be assessed from in vitro studies, possible chronic effects will remain unknown. Most of the presented work showed ingenious new strategies for future theranostic applications, although researchers seem to be aware that in many cases the scaffolds used experimentally today should be considered as models, which may be modified or even replaced by



*Dr. Francesco Ricci from Università di Roma Tor Vergata, Italy presents his work entitled: DNA-based nanodevices for diagnostic applications*

other, more tolerable matrixes in the future.

Finally, Dr. Vladimir Gubala presented concluding remarks and thanked all the participants for attending the event, which elucidated the present state of this popular field and provided a vivid platform to discuss future developments.

The workshop was highly successful not only regarding the quality of science presented, but also the discussions and future collaborations between participants from overlapping disciplines. Importantly, this workshop fully supported the contributions of the young scientists who showed their appreciation by numerous congratulations to the organizing committee and IUPAC.

[www.iupac.org/project/2014-013-1-700](http://www.iupac.org/project/2014-013-1-700)