Green Indicator

This issue of the Green Indicator takes a quick look at the outcome of the United Nations Conference on Sustainable Development. Although the media coverage of the conference was immense, a discussion on topics related to the green chemical industry was most often missing. The CatScan section discusses the possibilities that are opening up for catalysis research combining advanced microscopy and materials.

/Fredric Bauer

Green Future for the Chemical Industry

Two weeks ago, the world's largest conference on sustainable development was held in Rio de Janeiro, the Rio+20 conference. Governments, NGOs, industries and indigenous minorities, among others, were represented and tried to force global development into a more sustainable one. A main focus of this conference was the advent of the new "green economy", an economy in which externalities are being priced efficiently and the cost for these externalities better reflect the actual impact. In the end, a non-binding document called *The Future We Want* was signed, although it has been criticized for being toothless and without new visions.

What are then the prospects for the chemical industry in this future? The document contains a section on chemcals and wastes in which it states that the sound management of chemicals is crucial for health and the environment. Further, it emphasises the need for a life cycle perspective, an extended producer responsibility and actions against dumping of hazardous materials – plastics are pointed out as posing particular challenges. Further, the need for development of new, safer alternatives to chemicals used in products and processes is stressed. Thus it seems that the growing green chemical industry have the support of the leaders of the world to quickly implement new technologies and shift from processes based on fossil and often hazardous feedstocks to biobased, environmentally benign processes.

However, as always, it is not that easy. The policies for the green economy are yet to come, and may take many years before being fully implemented as they will have to include new types of taxes, credit markets and fees. Meanwhile, over the last six months the prices for oil, naphtha and other fossil feedstocks have decreased, some as much as 30%. With an oil price now well below $100/bbl investments in new technology and the real breakthrough for new renewable materials, e.g. polymers from lactic, adipic or succinic acid, may be further delayed. The Rio+20 will thus probably not mean any great changes in the near future for the chemical industry, but the discussions and the final document can hopefully at least convince a few sceptics of the need for a green chemical industry.

The Future We Want is available for download on
http://www.uncsd2012.org/rio20/thefuturewewant.html

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Catalyst Characterization

There is a continued development in the width and depth of the tools available for catalyst characterization and investigation. There are several tools which have seen an enormous improvement in resolution and precision only over the last decade or so and one of these is the high resolution transmission electron microscope. Now the boundary of this piece of equipment has been further stretched with the advent of a new type of cell making it possible to look not only at solid material but also at liquids (Science 336 (2012) 61).

The investigation of liquids has thus far been hampered. First of all, the electron microscopy requires vacuum making uncontained liquid samples impossible to study. Secondly, the use of sampling cells has been hindered by the need to use cell windows with relatively high thickness and atomic number. The key development reported in the paper is the preparation of sample cells, containing the liquid, out of graphene. The graphene "blister" makes for a good electron transmittance through the sample and the authors were able to study the coalescence of platinum particles in real time.

This growth of platinum particles is off course only a first step in the use of this type of cell. With a catalyst perspective, it may be possible to study e.g. polymerisation reactions or indeed, with further improved resolution, homogeneous phase catalysis in action.

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