



# The tension mounts



We can at last reveal the innovations that have made it through the first round and will go on to the final stages of judging in September. The category winners and overall winner for this year will be revealed in mid-October

**JOHN BAKER** LONDON

**T**his year's ICIS Innovation Awards have attracted a near-record number of entries, resulting in a strong short-list of innovations to progress to the final stages of the competition. ICIS will reveal the category winners and the innovation of the year in this magazine in mid-October.

The Awards, now in their 11th year, are again sponsored overall by Roland Berger Strategy Consultants; with the environmental category once more sponsored by U.S. Chemicals. Both are long-term supporters of the Awards and ICIS is pleased to thank them for ongoing support.

The range of innovations in the short-list is as usual extensive, emphasising the depth and

breadth of innovation that the chemical industry is capable of. There was particular depth in the environmental/sustainability category, and the judges have put forward four rather than three entries for final judging. They also determined, however, that no entries really made the grade in the business innovation category.

The mature but innovative textile sector continues to stimulate new ideas, especially as producers seek to add value to their offering to counteract Asian commodity competition and reduce the environmental impact of the sector. Three of the 13 short-listed entries feature innovations in textiles.

This year we also feature several key process



Rex Features

developments, driven by the need to develop alternative and more effective routes to olefins and titanium dioxide, and innovations in PU foams and liquid packaging, as well as novel routes to versatile chemical intermediates.

You can read a description of each short-listed entry in the following pages. They have been chosen by this year's specially selected panel of judges (see panel), who will meet in early September to consider each entry in detail and select the winners. ICIS also thanks them for bringing their expertise to the Awards and ensuring that the best innovations are recognised. All that remains for me to do is wish all our finalists the very best of luck. May the best innovations win!

#### **BEST PRODUCT INNOVATION SPONSORED BY ROLAND BERGER**

##### **Clariant**

**Vladimir Fridman, Michael Urbancic, Jay Merriam, Lorena Oviol, Stefan Brejch**  
*Heat-generating material for on-purpose olefin production*

Houdry technology for dehydrogenating alkanes to alkenes is receiving much interest

because of the supply-demand gap for C3 and higher olefins. Technology owner Clariant has developed a new concept – a Heat Generating Material (HGM) – in the form of a metal oxide on a proprietary carrier that is loaded into the catalyst bed. This HGM is inert towards the feedstock but undergoes oxidation and reduction during the Houdry operating cycle, producing heat inside the catalyst bed, which reduces the quantity that has to be supplied and also establishes a more favourable catalyst-bed temperature profile that increases olefin selectivity and reduces by-product formation. The decreased operating severity reduces stress on both catalyst and equipment. The overall process improvement reduces the carbon footprint of a typical unit by several 10,000 tonnes/year of CO<sub>2</sub> and increases olefin yield by several percent.

#### **Solvay Group - Rhodia**

##### **Francisco Ferraroli**

*Emana – a polyamide fibre that emits far-infrared radiation*

Solvay's *Emana* is a patented polyamide fibre that emits radiation in the far-infrared (FIR), bringing well-being benefits in the cosmetic and sports performance segments of the textile industry. *Emana* is based on specially treated inorganic charges embedded in the polymeric matrix of the microfibre filaments. These charges emit FIR in specific wavelengths, promoting bio-stimulation in the skin, thus acting as a fibroblasts growth factor and stimulating nitric oxide synthesis, which significantly enhances microcirculation. In the cosme-to-textile area, *Emana* garments improve skin elasticity and reduce the appearance of cellulite. In sportswear, *Emana* helps athletes to reduce muscle fatigue and have a faster muscle recovery. The benefits have been demonstrated in scientific tests performed in universities and independent research institutes and in four years of extensive clinical trials.

#### **BASF**

**Dr Frank Prissok, Dr Christian Daeschlein, Dr Peter Gutmann, Juergen Ahlers, Martin Vallo, Raymond Toh, Dr Elke Marten, Torben Kaminsky, Armin Noethe, Dr Uwe Keppeler, Jürgen Bartl, Dr Andreas Eipper, Dr Frank Wierschem, Hans Rudolph, Bernd Lohaus and Dian Jun Chen**

*Infinergy – World's first expanded particle foam based on thermoplastic polyurethanes*

With *Infinergy*, BASF has introduced the world's first particle foam based on expanded thermoplastic polyurethanes. The combination of extraordinary mechanical properties and easy processing with an available technology make the material unique. *Infinergy* offers unprecedented unknown high-energy return with excellent tensile and flexural characteristics. As a result, *Infinergy* is being used as the main >>

## THE JUDGES FOR 2014



#### **Dr Neil Checker**

Neil is a partner at Roland Berger Strategy Consultants and part of the global chemicals leadership team, based out of the firm's Dusseldorf office. Neil has over 30 years of industry and consulting experience in the chemicals and process industries.



#### **Pascal Juery**

Pascal is a member of the executive committee of Solvay. He joined Rhone-Poulenc in 1988 and became head of Rhodia's Novacare business and a Rhodia executive committee member. He is a graduate of the European Business School of Paris (ESCP).



#### **Dr Werner Breuers**

Werner is a former board member of LANXESS. His responsibilities and strategic areas of operations included the Performance Polymers and Advanced Intermediates segments and Global Procurement & Logistics, Innovation & Technology and Industrial & Environmental Affairs.



#### **Dr Peter Nagler**

Peter is chief innovation officer at Evonik Industries and was previously head of Corporate Innovation Strategy & Management. He joined Degussa after studying chemistry at the Johann Wolfgang Goethe-University and biochemistry at the University of Nice.



#### **Dr Jacques Komornicki**

Jacques is innovation manager at Cefic, the European Chemical Industry Council, and represents the SusChem European Technology Platform for the chemical industry. He has a PhD in chemistry and has worked for 30 years in R&D with Arkema and its predecessors.



#### **Dr Peter Williams**

Peter was appointed CEO of INEOS Technologies in 2006 when the business was created as part of INEOS. Prior to joining INEOS, he worked for BP for 23 years in numerous leadership positions in both the UK and France. He has a DPhil in chemistry from the University of York.

**OVERALL SPONSOR ROLAND BERGER STRATEGY CONSULTANTS**

**COMMITMENT TO IMPROVING INNOVATION**

ROLAND BERGER is honoured to continue in its role of overall sponsor of this prestigious awards programme, as well as sponsor of the Best Product Innovation category. Our sponsorship supports our commitment to helping clients develop and improve their innovation capabilities from innovation strategy through to implementation of innovation processes and organisation structures.

Roland Berger has a competence centre focused on innovation management – Innovation and



Product Engineering (IPE) – and this team leads projects and develops thought leadership on this critical area, leveraging the cross-industry and global experience of the firm.

The consultancy is one of the world's leading strategy consultants, founded in 1967, with 2,700 employees working in over 50 offices in all major international

markets. The strategy consultancy is an independent partnership exclusively owned by about 250 partners.

The firm advises leading corporations, non-profit organisations and public institutions on management issues ranging from strategy development to performance improvement. Roland Berger's business is organised into global functional and industry competence centres. Its practice areas include corporate and business unit strategy, marketing and sales,

innovation strategy and management, operations strategy, restructuring and corporate finance and mergers and acquisitions advisory.

Industry specialties include energy and chemicals, automotive, consumer goods, retail, engineered products and high-tech, financial services, information communications, pharmaceuticals and health care, public services and transportation.

**Dr Neil Checker**  
Partner, Roland Berger Strategy Consultants

» sole component of Adidas's new *Boost* running shoe series, brought to market shortly after its development at BASF. Numerous additional applications are planned, for instance, in the leisure, sports and packaging sectors.

**BEST PROCESS INNOVATION**

**Axens/Total/IPFEN**

**Thomas Mallet**

***Atol – innovative technology for bioethylene production***

*Atol*, the result of a partnership between Axens, Total and IFP Energies nouvelles (IPFEN), is a technology for production of polymer-grade bioethylene by dehydration of first and/or second generation renewable ethanol. Total developed a high performance catalyst formulation at its research centre in Feluy, Belgium; IPFEN scaled-up the catalyst performance within an innovative heat recovery process; and Axens industrialised the catalyst formulation and finalised the process scheme with particular focus on energy efficiency. *Atol* relies on a new type of catalyst, providing high activity and a high selectivity toward ethylene, maximising carbon efficiency and significantly reducing bioethylene production cost. The *Atol* catalyst provides high hydrothermal stability and high tolerance to poisons allowing it to cope with feedstock quality variations. The caustic tower and ethane/ethylene splitter in the conventional process are eliminated in the *Atol* process.

**Honeywell UOP/INEOS/Total**

**Gavin Towler**

***Advanced methanol-to-olefins (MTO) process***

Honeywell UOP's Advanced MTO process, developed with INEOS and Total, produces propylene and ethylene from methanol. UOP scientists were the first to apply the discovery of SAPO-34, a new molecular sieve, in the 1980s to MTO chemistry. UOP continued development with partner INEOS (Norsk Hydro at the

time), which operated the first 1 tonne/day demonstration unit in 1995. This technology relied heavily on UOP's fluidised bed reactor design. In the mid-1990s, UOP worked with Total on a technology for conversion of naphtha-range olefins to ethylene and propylene. Total started the first Olefin Conversion Process (OCP) demonstration plant in Antwerp in 1998. MTO and OCP have since been integrated into a single Advanced MTO design. The first UOP-licensed MTO/OCP complex was successfully started up in 2013 by Wison, in Nanjing, China.

**Contract Chemicals/Bayer Technology Services/Bayer CropScience**

**Peter Yates (Contract Chemicals), Ursula Jansen (Bayer CropScience) and Sebastian Hoch (Bayer Technology Services)**

***Collaborative real time process development through reaction modelling***

An innovative collaboration between Contract Chemicals, Bayer CropScience and Bayer Technology Services (BTS) solved the challenge of investigating a complex five-stage synthetic pathway and resulted in a late-stage intermediate for a new crop protection product. The goal was to double capacity, with lower cost, waste and impurity levels, higher throughput and reduced plant expansion costs, without compromising quality. This had to be achieved in six months to service a rapidly growing market and the agrochemical spraying season. The methodology chosen was to identify the most critical reaction stage, then combine real process and production plant data interactively with reaction modelling techniques. The reaction was proven at plant (10 tonne) scale. The result was a 60% reduction in impurities, a 30% increase in yield and a decrease in plant reaction time by 52%. This has led to a multi-year manufacturing contract – over 200 tonnes of product have now been manufactured by this process.

**BEST INNOVATION BY AN SME**

**Liquid Light**

**Laura Keesee**

***Liquid Light – process technology to convert CO2 into high-value major chemicals***

US-based Liquid Light develops and licenses process technology to make major chemicals from carbon dioxide (CO<sub>2</sub>). It aims to deliver significantly lower total production cost than petrochemical-based processes while helping companies address sustainability issues. The core technology is centred on catalytic electrochemistry to convert CO<sub>2</sub> to multi-carbon chemicals, combined with hydrogenation and purification. By adjusting the catalyst design, various chemicals can be produced. Liquid Light's first process is for production of ethylene glycol, a key ingredient in PET. By using common co-feedstocks along with CO<sub>2</sub>, a plant may produce multiple products simultaneously. Additionally, the technology can be powered by renewable energy sources, providing an even lower footprint. The company has 14 issued patents, with 100+ pending. Results consistent with cost-advantaged production have been validated at lab scale for key parts of the process.

**Sirrus**

**Jeff Uhrig, Kousay Said and Jeff Sullivan**

***Sirrus – advancing manufacturing technology through chemistry***

US-based Sirrus has unveiled a platform of reactive monomers based on 1,1-disubstituted alkenes and will be offering them under the *Chemilian* and *Forza* brand names. The potential of 1,1-disubstituted alkenes has been recognised for some time, but commercialisation has been elusive due to the reactive nature of the monomers and the low yields of synthetic routes. Sirrus solved these challenges by developing an economical, novel synthetic route complemented by proprietary stabilisation techniques. Products using Sirrus materials

have significant advantages, including rapid polymerisation times at ambient temperatures, which dramatically reduce energy consumption. This fast, room temperature, on demand polymerisation applies to a wide range of manufacturing and assembly processes. The platform allows for monomers with a broad range of physical and optical properties, similar to acrylics, but includes potential for both anionic and free-radical polymerisation.

#### Argex Titanium

**Roy Bonnell, Enrico di Cesare and Philippe Guillemaille**

#### Argex technology – a third-generation process to manufacture titanium dioxide

Canada's Argex Titanium has developed an alternative to the sulphate and chloride routes used to make TiO<sub>2</sub> pigment. Its *Argex Technology* (AT) uses chemical and hydrometallurgical processes in a patented closed-loop technology to produce high-purity TiO<sub>2</sub> directly from the ore material, avoiding the need to upgrade it to ilmenite. Proven equipment is used at atmospheric pressure and low temperature. At the heart of the process is a leach of the ore (ilmenite, with no limit regarding TiO<sub>2</sub> content or tailings) with hydrochloric acid, followed by two solvent extractions: one to remove iron compounds and one to remove pure titanium compounds (TiOCl<sub>2</sub>). AT is another step towards environmental protection due to its high energy efficiency, low emissions and closed-loop design. This uses relatively low levels of hydrochloric acid that can be regenerated after use. A pilot is running at Valleyfield, Quebec, where a production plant is under construction.

#### INNOVATION WITH BEST BENEFIT FOR THE ENVIRONMENT OR SUSTAINABILITY SPONSORED BY U.S. CHEMICALS

##### Huntsman Textile Effects

**Mindy Chee**

#### Revolutionary dyes confront textile industry sustainability challenges

As a leading global provider of high quality dyes and chemicals to the industry, Huntsman Textile Effects is committed to help it meet the toughest environmental and economic challenges. The company's revolutionary *AVITERA SE* range consists of tailor-made poly-reactive dyes ensuring rapid, very high exhaustion and fixation when dyeing cotton and its blends. When compared with current best-available technologies, *AVITERA SE* enables textile processing mills to reduce water consumption, energy consumption and CO<sub>2</sub> emission by up to 50%; salt consumption is cut by 20% and cycle times by 25%. Machine suppliers using sophisticated dyeing/washing-off equipment confirm water consumption of 15 litre/kg of dyed fabric is a reality with *AVITERA SE* dyes. Since its launch, *AVITERA SE* has saved 4bn litres of water and 150m kg of carbon emission.

#### CATEGORY SPONSOR U.S. CHEMICALS

### CREATIVE APPROACH TO THE ENVIRONMENT

FOR THE past five years, U.S. Chemicals has been honoured to sponsor the Best Environmental Benefit category. We are pleased this year to see the category widened to include innovations that support and drive sustainability innovation as well, in line with our own company philosophy.

Serving the needs of the chemical industry for over 50 years, U.S. Chemicals LLC combines quality, innovation and service like none other. U.S.



Chemicals has built a team of industry experts that thoroughly understands the complexities of the chemical industry and includes experts at material sourcing and acquisition.

U.S. Chemicals serves as a single source for the chemical acquisition needs of many industry sectors, including paint, ink and coatings; chemicals

and textiles; cosmetic and personal care products; flame retardants; food and pharmaceutical; plastic; and rubber. It offers prompt delivery from multiple warehouse locations throughout the US.

Its world-wide network of resources assures customers of highly competitive pricing, optimum quality and consistency, and rapid worry-free sourcing and delivery.

#### Carol Piccaro

President and CEO

#### BASF

**Tao Wang, Dr Frank Funke and Sharon Tan**

#### Wholistic future finishing system – “Zero add-on” non-iron performance using Fixapret Resin WFF textile finishing system

BASF's patented non-iron resin, *Fixapret Resin WFF*, used in textile manufacturing to create a non-iron effect, enables high wrinkle-free effect combined with zero add-on formaldehyde, yet maintains optimal fibre strength. Previous resins resulted in a trade-off between non-iron performance and fibre strength. The new resin contributes to the three pillars of sustainability defined by BASF Textile Chemicals in accordance with its theme “Putting Future into Textiles”: consumer safety, resource saving and environment protection. It does not use formaldehyde; can be applied in a one-step process, thus reducing energy and water consumption; and is biodegradable. Formaldehyde found in textiles is of particular safety concern for end-users due to the often direct contact with the skin and regulations are becoming increasingly strict. Also, *Fixapret Resin WFF* provides excellent abrasion resistance to the garment compared to a classical wrinkle-free system, due to its longer and more flexible cross-linkages.

#### Solvay

**Phillippe Krafft, Patrick Gilbeau, Benoit Goselin, Bruno Fouchet, Romuald Fix and Ivan De Andolenko**

#### Breakthroughs make epichlorohydrin technology eco-friendly

Solvay's *Epicerol* epichlorohydrin (ECH) uses glycerol as a main raw material, available as a by-product of biodiesel and oleochemicals production. But as well as introducing a new renewable feedstock route to the epoxy resin intermediate, Solvay's process also tackles a major environmental issue of conventional ECH manufacture: the production of salty water/brine polluted by chlorinated organics, for which no

satisfactory disposal solution has been found. The *Epicerol* process solves this issue by recycling the brine in membrane chlor-alkali electrolysis, after a special treatment called Solox based on oxidation by chlorine. Life cycle assessment “cradle to gate” of the *Epicerol* process shows reductions of 61% of the global warming potential in comparison with the propylene process. Solvay has a 100,000 tonnes/year *Epicerol* plant in Thailand and has developed partnerships along the manufacturing chain to guarantee the origin of its ECH to final application.

#### Dow Packaging & Specialty Plastics

**Cassidy Christian**

#### PacXpert – An alternative to rigid packaging

Dow Packaging & Specialty Plastics is committed to delivering solutions that optimise environmental efficiencies. Recently, Dow reinforced that promise through a global licence with inventor Ken Wilkes for a new packaging design. Initially coined *SmartBottle* by Wilkes, Dow trademarked it globally as *PacXpert* Packaging Technology. The package can be used across a variety of household, institutional and industrial applications including food, liquids and dry goods, and is available in sizes ranging from 1-20 litres. *PacXpert* offers advantages along the entire supply chain. For manufacturers and brand owners, it requires less raw materials than its rigid counterparts and as a result of its lightweight design and ability to ship flat when empty, it increases transportation efficiencies and potentially lowers CO<sub>2</sub> emissions. Furthermore, *PacXpert* occupies less receptacle and landfill space. For end-users and consumers, *PacXpert* reduces content waste through improved product yield. The technology also provides fitment closure options that can extend the life of air-sensitive products. ■



For more information on how to enter the Awards and on previous winners, the sponsors and judges, go to [www.icis.com/awards](http://www.icis.com/awards)