

All set for the big reveal

Who will win the ICIS Innovation Awards this year? Seventeen entries across six categories are in the running, as revealed in the shortlist below. The winners will be announced in mid-October, but until then you are free to choose your own favourites!

ICIS



INNOVATION AWARDS 2017



JOHN BAKER LONDON

The panel of seven leading industry innovation experts has been busy since the end of June deadline for entries to this year's ICIS Innovation Awards. They have assessed a near-record number of entries and drawn up a strong shortlist of contenders to go forward to the final judging session in early September.

They will select a winner in each category and an overall winner for 2017.

The quality and range of entries to the four categories for companies have as usual been impressive and have presented the judges with a difficult, but hopefully stimulating task. Many thanks to them for bringing all their expertise to bear to the process.

For the second year running, ICIS and the lead sponsor of the Awards, Elsevier's R&D Solutions, have also sought to reward individual innovation excellence, through two categories introduced last year – the Alpha Innovator of the Year categories.

In addition to Elsevier's R&D Solutions as the overall sponsor, the ICIS Innovation Awards continue to enjoy the support of distributor U.S. Chemicals and ExxonMobil Chemical as category sponsors. They are joined this year by global management consultancy Accenture.

ICIS is grateful to all four companies and their interest and support in the Awards, designed to recognise and celebrate the best of innovation in the chemical industry.

The range of innovations in the shortlist is as usual extensive, emphasising the depth and breadth of innovation of which the chemical industry is capable. The categories cover product and process innovation, as well as innovations by small and medium-sized enterprises (SME) and inno-

» vations that have benefit for the environment and sustainability.

You can read details of each of the short-listed entries below. I am sure you will have your favourites, but will they match those selected by the judges? And which will emerge as the best innovation of the year?

All will be revealed on 13 October in the pages of this magazine and on our web site, <http://www.icis.com/awards>.

All that remains for me to do is to wish the shortlisted candidates the very best of luck. May the best innovations win!

**BEST PRODUCT INNOVATION
SPONSORED BY ACCENTURE**

AKZONOBEL

David Moore

Interline 9001

Interline 9001 is an advanced coating system for ship's cargo tanks, which in 2016 enabled AkzoNobel to take a greater than half share of total global new-build volume. The coating is based on patented *BiModal* technology, formulated at lower stoichiometry than conventional epoxy amine systems. It undergoes initial conventional cure at room temperature before being subjected to a high temperature post-cure, which induces homopolymerisation of unreacted epoxy groups in the presence of a catalyst. This delivers very high conversion and results in a very highly cross-linked network which is the basis of the step change in chemical resistance performance of *Interline 9001*. The superior performance of *Interline 9001* can be attributed to very low, often zero, cargo absorption, which is significantly lower than comparable products. It is also recognised as a sustainable coating solution due to the unique easy-clean properties and performance longevity. *Interline 9001* is thus a significant advance in coatings technology for cargo tanks.

DOW CHEMICAL AND TOTAL

Nadjet Khelidj and Carin Bove (Dow) and Nicolas Champagne (Total)

UCON oil-soluble polyalkylene glycols (OSPs)

To combat climate change, many countries have established mandates to reduce CO2 emissions and improve fuel efficiency in transportation. Through significant research and development (R&D) collaboration, Dow and Total have developed lubricants that provide significant efficiency gains in the drive train (engines, axles, and transmissions) through the use of Dow's *UCON* OSP products. Engine testing has shown these improve fuel economy by as much as 4% over conventional materials and up to 1% over typical synthetic formulations. In addition to fuel efficiency performance, lubricants using *UCON* OSPs as performance additives also deliver improved engine cleanliness through the detergency provided by the unique OSP backbone. The collaboration has resulted in a contract to produce engine oils for a leading automobile manufacturer. This accomplishment represents a significant milestone and advancement of *UCON* OSP technology in engine oils.

TEIJIN

Professor Yoshiro Tajitsu, Faculty of Engineering Science, Kansai University; Tomoyoshi Yamamoto, manager, Solution Development Center, Teijin; Dr Tetsuo Yoshida, manager, Film Development Center, Teijin Film Solutions

PLA piezoelectric materials

Japan's Kansai University and Teijin have developed piezoelectric materials based on polylactic acid (PLA). The bioplastic's flexibility and lightness mean it can be used in large, light-weight applications that are difficult to achieve with conventional piezoelectric materials such as lead zirconate

titanate and polyvinylidene fluoride. In 2012, they produced the world's first binary-blended PLA multilayer film, which has been used in piezoelectric fabrics which monitor elaborate human actions. In 2016, the world's first load-dependent and sustained-voltage piezoelectric roll was developed. The latest development was made in 2017 in the form of piezoelectric wearable sensors in the shape of braided cords known as *kumihimo*. Kansai University and Teijin are convinced PLA piezoelectric materials will contribute to the development of augmented-reality applications and expand the use of sensing and actuating devices in healthcare, apparel and other fields.

**BEST PROCESS INNOVATION
CLARIANT OIL AND MINING SERVICES**

Paul Gould

Veritrax

Chemical management in the oil and gas industry has long relied on human presence to monitor chemical inventory, pump control, analytics and more. Volatility of oil prices has many oil and gas companies changing their operating business model: updating production processes and leveraging automation to reduce costs are two very active areas. *Veritrax* is a true intelligent Chemical Management System, designed to streamline previously manual processes and promote adoption of cost-effective technology. The *Veritrax* system increases production efficiency, advances safety and improves transparency, through real-time data flow. All chemical management tasks, such as dispatch, dosing, monitoring, analysis, orders and invoicing, are controlled automatically with continuous real-time information delivered directly to a laptop or smart phone. *Veritrax* has been designed to provide many benefits through advanced functionality.

CATEGORY SPONSOR U.S. CHEMICALS

PRACTISING SUSTAINABILITY AND RESPECT FOR THE ENVIRONMENT

U.S. CHEMICALS, a Maroon Group company, is an organisation dedicated to enriching the lives of its employees and community by practising sustainability and respect for the environment. U.S. Chemicals is pleased to sponsor, for the ninth consecutive year, the Innovation with Best Benefit to Environment or Sustainability category of the ICIS Innovation Awards.

U.S. Chemicals is a diversified chemical distribution company that



supplies quality chemicals at world-wide pricing. For customers and supply partners U.S. Chemicals is a trusted collaborator, whose nimble team is dedicated to leveraging decades of experience, relationships and a can-do attitude to assess risk, thus making decisions quickly and acting boldly and accurately.

U.S. Chemicals is set apart by

the speed, flexibility and innovativeness of its employees. The team leads customers in identifying the best solutions for each opportunity and business challenge, grasping suppliers' and customers' needs and solving problems.

In addition to a variety of sustainability programmes – recycling, creation of green space/organic gardening, heating/lighting efficiency initiatives, paperless initiatives and wellness programmes at the headquarters in Darien,

Connecticut – U.S. Chemicals seeks suppliers, principals and logistics providers that have sustainable programmes and processes in place. Our business partners are vetted to ensure that standards are met.

Social responsibility and giving back have long been part of U.S. Chemicals' corporate culture and the company has an extensive history of supporting organisations in the environmental, educational and health arenas. ■

DOW CHEMICAL**Mark Siddoway****Fluidised catalytic dehydrogenation (FCDh) process**

Dow Chemical has developed fluid catalytic dehydrogenation (FCDh) technology to improve production of propylene from abundant US shale gas resources by increasing selectivity. The new technology is based on commercialised fluid catalytic cracking (FCC) technology and uses a proprietary catalyst and design to achieve 45% propane conversion at 93 mol% selectivity to propylene. The system's simplicity enables >20% capital savings and reduces energy requirements. FCDh can also be easily integrated into existing or new ethylene crackers enabling increased production or tailoring the facility for the desired amount of ethylene and propylene production. Additionally, the technology can be used in new or retrofitted ethylbenzene-to-styrene dehydrogenation facilities, butane to butene, or isobutane to isobutene plants. C4 dehydrogenation units can be integrated into refineries to upgrade butane or isobutane for use in the alkylation section to produce alkylate.

VERSALIS**Francesco Pasquali****ABS ONE STEP**

Versalis owns continuous mass technology for acrylonitrile-butadiene-styrene (ABS), high impact polystyrene (HIPS), general purpose polystyrene (GPPS) and styrene acrylonitrile (SAN) manufacturing, as well as many other elastomers technologies. Based on this, it has developed the ABS ONE STEP technology, a breakthrough technology that sets new rules for advanced styrenic polymers manufacturing. ABS manufacturing starts from elastomer bales, which – after reaction solvent removal, water drying and packaging – are sent to the ABS production site, ground and dissolved into ABS monomers. The ONE

STEP technology links the elastomer synthesis section with the ABS production plant by means of a proprietary-design solvent exchange section capable of removing rubber reaction solvent and replacing it continuously with ABS reaction monomers. The new technology overcomes constraints on elastomer structure as well as applying Versalis' living radical polymerisation (LRP) technology for rubber functionalisation. The innovative process design leads to significant reduction in costs due to the process integration of elastomer and ABS and to a reduction in the total investment cost for a new plant. The most relevant improvement, though, lies in a broad enlargement of the product portfolio.

BEST INNOVATION BY AN SME SPONSORED BY EXXONMOBIL CHEMICAL**AVERTANA****James Obern****Refining steel industry waste into valuable raw materials for everyday products**

Avertana has developed a proprietary process to refine valuable industrial minerals and chemicals from industrial waste streams. The technology offers significantly lower manufacturing cost and environmental impacts than existing routes. The company's current focus is on slag from the steel industry. The process refines this solid waste into raw materials used to manufacture products like paint, paper, fertilizers and building materials. The company is working to develop its first commercial plant in New Zealand and then plans to deploy the technology globally through partnerships with existing producers. Avertana's process uses sulphuric acid to convert metal oxides in the slag into sulphates, which are then selectively crystallised and filtered, yielding four separate products: TiO₂ pigment for paints and coatings; alum for water treatment and papermaking; Epsom salts for fertilizer >>

MEET THE JUDGES**CHRISTINA VALIMAKI**

is senior director, chemicals segment marketing, for Elsevier, a leading provider of information solutions to science, health and technology professionals. She has an MBA from Harvard Business School.

**DAVID WOODS**

is opportunity identification manager, new product platforms, at ExxonMobil Chemical, based in Baytown, Texas, US. He manages the pursuit of new product opportunities.

**JUST JANSZ**

is an independent board member and advisor, and founder and MD of business and technology management consultancy Expertise Beyond Borders. He has 30 years of experience with LyondellBasell and its precursors.

**MIKE MCKENNA**

is chief operating officer for Maroon Group, a North American specialty chemical and ingredients distributor. He is responsible for operational excellence, global supply partnerships and marketing, and is a member of the company's M&A team.

**PETER NIEUWENHUIZEN**

is global research, development and innovation director, specialty chemicals, at AkzoNobel, where he is focused on making chemistry both more profitable and sustainable. He joined the company in 2011 after five years at consultancy AD Little. He has a PhD from Leiden University.

**PIERRE BARTHELEMY**

is executive director for research and innovation at Cefic, representing the priorities of the chemical industry towards the EU institutions for innovation-related aspects. He joined Solvay in 1988 and was seconded to Cefic in 2014. He has a PhD from the University of Liege, Belgium.

**PAUL BJACEK**

is principal director and lead for Accenture's chemicals and natural resources strategic research, with over 25 years' experience in the process industries, including project activities in manufacturing, marketing and distribution. He has master's degree from LSE in London and a BSc in chemistry and business.

CATEGORY SPONSOR EXXONMOBIL CHEMICAL**BROAD PORTFOLIO OF EXPERTISE**

EXXONMOBIL CHEMICAL is one of the largest chemical companies in the world. Our unique portfolio of commodity and specialty businesses generates annual sales of more than 24m tonnes of prime products.

The commitment by ExxonMobil Chemical to maintain a leadership position in technology is fundamental to our continued success. We have a broad

ExxonMobil

Energy lives here™

portfolio of proprietary process, product and product applications expertise.

Now, more than ever, chemicals are the building blocks of modern life. Chemicals play a key role in fields integral to human progress, including transportation, agriculture, pharmaceuticals, medical

equipment, as well as efficient manufacturing and packaging of a wide array of consumer goods.

As an organisation with technological achievements that have enriched the lives of people everywhere, ExxonMobil Chemical is pleased to sponsor the Best Innovation by a Small or Medium-sized Enterprise category of the 2017 ICIS Innovation Awards. ■



ALPHA INNOVATORS

Two individuals in each of the Alpha Innovator of the Year categories have been shortlisted this year, the second year ICIS has sought to reward individual innovation excellence in association with the overall sponsor Elsevier's R&D Solutions.

NEW PRODUCT DEVELOPMENT/ PROCESS OPTIMISATION



MURALIDHAR INGALE

of Adroit Pharmachem in Vadodara, India, for his development of a patented process for converting waste ammonia and carbon dioxide into phthalocyanine compounds



THOMAS COLACOT

of Johnson Matthey for leadership of the team developing an atom-economical synthesis of a highly active palladium coupling catalyst

ENVIRONMENT AND SUSTAINABILITY



DR ANTON KAISER

of Clariant Oil & Mining Services for his work on building up the enhanced oil recovery technology programme at the company



DR MEI LI

of Dow AgroSciences for her work in the design, implementation and commercialisation of three novel agrochemical products

» and papermaking; and a gypsum and silica blend for building materials.

CELLUCOMP

Dr David Hepworth, Dr Eric Whale and Christian Kemp-Griffin

Curran

Scotland's CelluComp has developed and patented a biobased process and a novel multifunctional product called *Curran*, a form of microfibrillated cellulose (MFC) produced from waste (or co-product) streams from root vegetables, such as sugar beet pulp. It is renewable, biodegradable, nontoxic and does not compete for land with food or forest, which gives it environmental and economic advantages compared to MFC from wood. *Curran* has been developed to produce sustainable and green alternatives for a wide range of markets, such as paints and coatings, personal care, oil drilling, food, household products, concrete, composites and paper and packaging. As a multi-functional additive in paint formulations, for example, *Curran* acts as a film enhancer, imparting improved scrub resistance and eliminating macro- and micro-cracking in thick films at all temperatures. A 2% addition of *Curran* in paper increases its strength by 10%, allowing lightweighting or greater use of recycled paper. In personal and home care products, *Curran* improves suspension and rheology. In food, *Curran* helps reduce fat and sugar.

GENOMATICA

GENO BG

US-based Genomatica has taken a well-known chemical – 1,3-butylene glycol (BG) – and developed a better way to make it, biologically, via fermentation of common sugars. Its *GENO BG* process provides a high-quality, natural and sustainably-sourced solution that has the potential for high appeal in cosmetics and as a high-quality product for industrial uses. The *GENO BG* process contrasts with the conventional means of making BG starting with acetaldehyde, which is a toxin, an irritant and a carcinogen. Additionally, Genomatica uses the power and selectivity of biology to produce a distinctively pure product that is implemented with a simpler overall process than conventional petrochemical approaches. Together, this enables additional potential applications for the butylene glycol produced by their process, including in sports drinks and medical supplements as everyday wellness products. Genomatica's innovations have the potential for significant industry impact.

INNOVATION WITH BEST BENEFIT FOR ENVIRONMENT AND SUSTAINABILITY

SPONSORED BY U.S. CHEMICALS

DOW CHEMICAL AND THE KOEHLER PAPER GROUP

Brian Einsla

Voided polymer imaging technology for thermal paper

BLUE 4EST thermal paper with Ropaque

CATEGORY SPONSOR ACCENTURE

HELPING CHEMICAL COMPANIES TRANSFORM IN A DIGITAL WORLD

ACCENTURE IS pleased to sponsor the Best Product Innovation category of the 2017 ICIS Innovation Awards.

In today's business environment, companies need to continually reinvent themselves. At Accenture, we take an innovation-led approach to help clients "imagine and invent" their future. We are always looking ahead to anticipate what's next.

We use an innovation-led approach to help our clients develop and deliver disruptive innovations, and to scale them faster. From research, ventures and labs to studios, innovation centres and delivery centres, we help companies imagine the future and bring it to life.

Accenture's chemical industry group helps chemical com-

panies apply innovation, transformational strategies and digital enablement for growth, differentiation and superior operations. We have over 30 years of experience working in all segments of the chemical industry – including basic and intermediate chemicals, polymers, fibres and elastomers, agricultural chemicals, paints and coatings, industrial gases, and other specialty chemicals – across the value chain.

ABOUT ACCENTURE

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and



specialised skills across more than 40 industries and all business functions – underpinned by the world's largest delivery network – Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders.

With approximately 401,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives.

Go to: www.accenture.com. ■

NT-2900 Opaque Polymer spheres is a new technology that eliminates chemical developers and dyes present in today's thermal papers. These are widely used for receipts, tickets, tags and labels: the printed image is formed by heating the paper which contains a reactive combination of leuco dye and acidic developer, such as BPA (bisphenol-A) or BPS (bisphenol-S). Dow and Koehler's new approach eliminates the chemical developer entirely. A layer of air-filled, reflecting spheres effectively masks or hides an underlying coloured layer. When heat is applied from the thermal print head, it causes localised collapse of the air voids so the opaque layer becomes transparent. Where the collapse occurs, the underlying coloured layer is visible, creating an irreversible image. *Ropaque* NT-2900 is a patented composition designed with a glass transition temperature and multi-staged composition to facilitate collapse during printing, resulting in high print contrast.

ENERKEM

Vincent Chornet

Converting waste to everyday goods

Enerkem is setting a new standard in smart waste management. By using municipal solid waste as a feedstock instead of fossil- or crop-based products and recycling the carbon contained in trash to produce renewable chemicals and biofuels, Enerkem's proprietary technology provides a cost-effective,

sustainable alternative to the challenges associated with waste disposal for communities all around the world. Enerkem's solution helps accelerate advances toward a circular economy where waste becomes a resource to make everyday products greener. It equally answers the question of how to dispose of rapidly accumulating non-recyclable and non-compostable garbage, while preventing greenhouse gas emissions from waste buried in landfills, and creating value-added products from otherwise useless trash.

KEMIRA

Jaakko Ekman, Matti Hietaniemi and Marko Kolari

Recycling starch in packaging board making

Demand for packaging board is about 200m tonnes/year and growing. Cellulose fibres can be easily recycled, but packaging board also contains a significant amount of starch, up to 4% of board weight. With current technologies, recycling of this starch is not economically feasible and large amounts of new starch need to be added to achieve desired board properties. Kemira has developed a two-step concept called *KemRevive* for starch reuse. The core of the invention is to protect starch from degradation in the recycling process by utilising a specific inhibitor for amylase enzymes. Simultaneously, a novel system improving retention of protected starch into

finished board, is used. *FennoSpec* 1200, the patented product for starch protection, contains enzyme inhibitor and a special polymer component. This product can block amylase and thus starch degradation can be prevented, even in typical process conditions with high amounts of bacteria in the water.

RECYCLING TECHNOLOGIES

Elena Parisi

Turning residual plastic waste into a resource

UK-based Recycling Technologies has tackled the problem of recycling mixed residual plastics waste (RPW) by developing a fluidised-bed reactor that converts shredded RPW into a range of useful products, including *Plaxx*, a trademarked family of hydrocarbon-based commodity products with multiple industrial applications. The RT7000 reactor is the company's first generation of commercial processing plant, capable of chemically recycling up to 7,000 tonnes/year of plastic waste. It is designed specifically to process RPW, generally recognised as non-recyclable and therefore sent to landfill or to energy-from-waste facilities. RPW includes films, packaging, rigid food containers, pots and laminates. The modular design of the RT7000 reactor allows it to be installed on existing waste facilities, eliminating the need for transport of low-density plastic waste and significantly reducing the carbon footprint of the RT7000. ■

LEAD SPONSOR ELSEVIER'S R&D SOLUTIONS

ACHIEVING THAT INDIVIDUAL "ALPHA" MOMENT

THE FUTURE of the chemical industry relies on those who overcome challenges and drive critical advancements in compounds, formulations, advanced materials, and production processes.

In the chemicals industry, continuous innovation and process improvement have been the key to creating considerable value for customers and investors.

And yet, many accomplishments from the industry are not as visible to the market as they could be.

Industrial chemists, for instance, improve product performance and achieve customer requirements by innovating at the molecular level and discovering the changes in substances and processes that may have important implications to manufacturing, the environment and safety.

The same is true for the engineers working in manufacturing,

where process improvement and engineering design is the focus. Identifying changes to plant design, equipment and processes can meaningfully improve safety, reduce cycle times and minimise operational disruptions.

Reaching that "Alpha" moment – achieving an important milestone for the first time – may happen in an instant, but one does not get there without unrelenting perseverance, knowledge and skill.

It is therefore important to recognise those who are making these strides. With demands for high performance products; faster returns on innovation investments; lower costs of research and manufacturing; lower emissions; and safer manufacturing, the future of the chemical industry relies on those who overcome challenges and drive critical advancements in compounds, for-

mulations, advanced materials and production processes.

For this reason, Elsevier's R&D Solutions is honoured to again sponsor this year's ICIS Innovation Awards, celebrating the companies and individual innovators who have created and commercialised notable product and process innovations in the industry.

Additionally we are delighted to co-sponsor with ICIS the second

annual Alpha Innovator of the Year category, recognising two high-performing individuals who have played a critical role in improving product performance, solving customer problems and making progress towards environment and sustainability goals.

Let us celebrate those who are achieving commercial success through innovation while also paving the way for us to pass on a better Earth to future generations.

ABOUT ELSEVIER'S R&D SOLUTIONS

Elsevier's R&D Solutions is a portfolio of tools that integrate data, analytics and technology capabilities to help chemical companies more efficiently achieve commercial success, safety, and compliant manufacturing for chemical products and processes. ■

