

ACHEMA WORLDWIDES

News



A special edition from
PROCESS



Securing Our Future *with Innovations*

Chemistry has a long tradition in Germany. Nearly 150 years ago, creative scientists and daring entrepreneurs came together and laid the foundation for a great industry. In only a few decades, its achievements enriched our world: initially with dyestuffs, next with fertilizers and pharmaceuticals and, after that, mainly with new materials.

This key industry is and remains an important cornerstone for a sustainable development – because chemistry is often invisible, but almost always indispensable for practical answers to the challenges of the global society: environmentally sound energy supplies, sufficient food, better health for an aging population, more mobility in newly industrialized countries and in the megacities of our planet. Products and problem solutions from the chemical industry will make increasingly important contributions in these respects. Germany's third largest industry has the nucleus for the necessary innovations.

Over 40,000 persons work in the research laboratories of German chemical companies. They significantly contribute to other core industries in Germany – such as carmaking, mechanical engineering or electrical manufacturing – succeeding with their products in the world market. Major impulses for problem solutions come from basic research. For this reason, roughly one third of chemical companies in Germany continue the tradition of cooperating with universities and public research facilities like, for example, the Leibniz Association, the Max Planck Society, the Fraunhofer-Gesellschaft or the Bunsen Society. The following applies in particular to our search for new energy sources: solar cells, wind power plants for electricity generation, high-performance batteries or fuel cells for electric mobility, insulating materials or heat storage equipment for low-energy housing – none of them would be possible without the know-how and the products from chemistry.

The chemical industry is one of the most research-intensive industries in this country. The some 2,000 chemical companies in Germany achieve sales of 30 billion euros annually with products aged less than three years. This corresponds to more than one sixth of total chemical industry sales, which most recently amounted to over 170 billion euros. It is worth noting



**Dr. Utz Tillmann, Director General of
Verband der Chemischen Industrie (VCI)**

that we did not cut our research spending during the economic crisis. In 2010, the German chemical industry dedicated around 9.4 billion euros to research. In the present year 2011, chemical companies are planning to further increase their R&D budgets to nearly 10 billion euros. Our innovative strength is visibly expressed in research results leading to patents: in Germany, every fifth patent with technological impulses for several industries comes from chemistry.

Good marks go to the research location Germany too. Germany has the best qualified staff within the European Union. The high density of universities and research facilities provides an excellent basis for innovations. Patent protection meets the most exacting standards. Germany also does well in an international comparison: Germany is the third-largest innovation location for chemistry, following the USA and Japan. Over eight percent of the chemical industry's research spending inside the OECD is made in our country.

Innovations are the basis and the drivers of a long-term growth strategy. We can secure and shape our future with innovations. Chemical industry products will play an important role in the question of whether we can lastingly bring our planet on a sustainable course. Chemistry accepts this challenge.



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– founded on tradition, working for the future

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The impressive ammonia reactor in front of the DEHEMA Research Institute

Pictures: DEHEMA

Do you know...

*...the DEHEMA Research Institute
– founded on tradition, working for the future*

– DR. KATHRIN RÜBBERDT –

Most people entering Frankfurt by car from the autobahn heading for the city center or the fair grounds take notice of an unusual sight: The impressive ammonia reactor in front of the DEHEMA Research Institute. Fewer people, however, are aware of what is going on in the blue-tiled building behind the corroded column: At the DEHEMA Research Institute, chemists, engineers, and biotechnologists work on the development of sustainable technologies for future generations. Their success is based on a unique portfolio of core competencies that have been developed and advanced over five decades.

The DEHEMA Research Institute was founded in 1961. Today, about 80 researchers and technicians work in fields such as energy storage, industrial biotechnology, fuel cells, or materials for modern applications. "Our work is rooted in our expertise

in a range of relevant disciplines: materials science, chemical technology and biotechnology," explains Professor Michael Schütze, Head of the Institute and worldwide renowned corrosion researcher. These competencies are intelligently and flexibly combined to create synergies that are tailored to address today's technological questions. Interdisciplinary cooperation is organized within four research clusters: Energy transformation and storage, integrated chemical-biotechnological production, recycling of inorganic resources, and innovative concepts for corrosion prevention.

Flexibility is Trump

Many of the institute's research projects are part of the federal program "joint industrial research" (Industrielle Gemeinschaftsforschung IGF). This scheme is sponsored by the German Federal Ministry for Economy and enables small and medium-sized enterprises to engage in pre-competitive research projects whose results are made public. The range of projects indicates the flexibility of the institute: The biochemical en-

The author is Head of Public Relations of DEHEMA e.V.

gineering group focuses on the production of terpenoids that are used as flavor and fragrance compounds, in pharma, cosmetics, and other applications. Last year, a biotechnological process for the production of perillic acid from limonene was adopted for commercialization by German biotechnology company BRAIN.

The electrochemistry group is active in the development of fuel cell and battery technology, but also in processes for water purification and the development of functional surfaces. And electrochemistry is also an important discipline that plays a part for the development of novel biotechnological production systems: The combination of electrochemistry with enzymes leads to new bioelectrocatalytic processes that are independent of expensive cellular cofactors such as NADPH.

In the basement of the institute, the high-temperature furnaces are literally glowing. This is where materials are tested and new protective layers are developed. This goes beyond obvious high-temperature applications for airplanes, turbines or cars. Recovering valuable resources from waste is one big issue that calls for robust, long-living high-temperature materials. One current project deals with the use of sewage sludge ashes in fertilizers to recover the contained phosphorous. A prerequisite is the removal of heavy metals in a thermochemical process; so far, no furnace materials are commercially available that can withstand the required con-

ditions over longer periods of time. Researchers at the DECHEMA Institute are developing a new coating concept combining the chemical resistance of corundum with the mechanical properties of an alloy that could be employed in such furnaces. Other projects concern the optimization of anodisation layers on magnesium with nanoparticles or the use of the halogen effect in titanaluminides.

Interdisciplinarity in Any Way

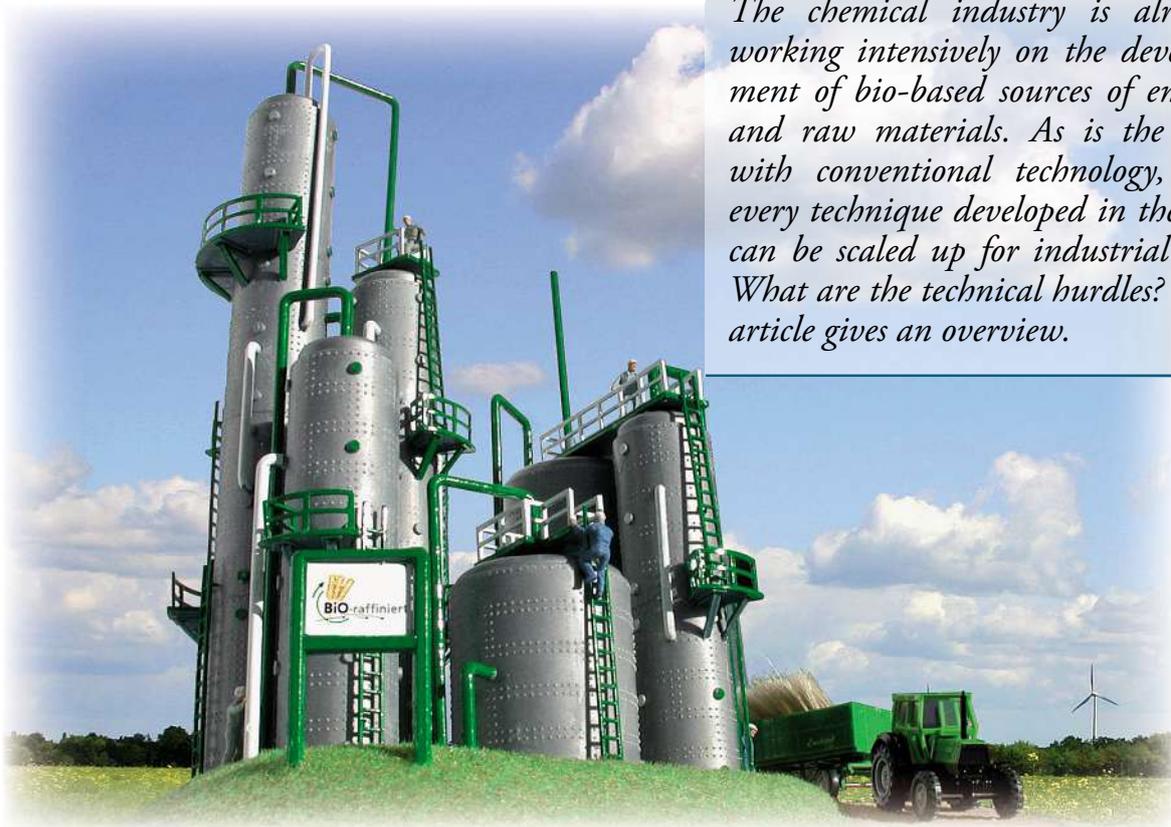
"Our strength is that we are interdisciplinary in every way. Chemists work with engineers, biotechnologists with corrosion researchers. And we are very flexible; we can react quickly to new trends and cooperate with industrial partners without requiring a lot of administration," says Professor Schütze. A long list of industrial partners underlines this. At the same time as being closely cooperating with the industry, the institute is interlinked both with the community active at DECHEMA and the academic sphere where the senior scientists of the institute have teaching assignments. Thus, the DECHEMA Research Institute brings together knowledge and people from all parts of the chemical engineering and biotechnology community – certainly a key asset in an interlinked and flexible world. ■

In the basement of the institute, the high-temperature furnaces are literally glowing. This is where materials are tested and new protective layers are developed.



Biomass Creates *a New Set of Challenges* for Equipment Manufacturers

The chemical industry is already working intensively on the development of bio-based sources of energy and raw materials. As is the case with conventional technology, not every technique developed in the lab can be scaled up for industrial use. What are the technical hurdles? This article gives an overview.



Picture: Fraunhofer Umsicht

Biomass and the related markets are in the ascendancy, and that is reflected in the investment levels. The Biomass Markets and Technologies study published by Pike Research at the end of 2010 made the prediction that worldwide investment in the biomass market will continue to grow at a stable rate over the next five years. According to the study, investment will increase from \$28.2 billion in 2010 to \$33.7 billion in 2015.

Biomass covers a broad spectrum both in terms of the source of materials and the end products. The European Biomass Industry Association (EUBIA) has defined four categories of biomass conversion: direct combustion, thermochemical conversion processes (pyrolysis and gasification), biochemical processes (anaerobic digestion, fermentation) and physico-chemical processes (the route to biodiesel). The choice of technology depends on the chemical composition of the raw materials and the target product.

Similar to a petrochemical refinery, biorefineries convert biomass to produce a series of chemical raw mate-

rials and fuel products. Integrated biorefinery concepts are still in their infancy for the most part, and as a result biorefineries in Europe are few and far between. Most are demonstration or pilot plants – biorefineries operating on a commercial basis tend to be the exception. As of 2010, there were seven biorefineries in Germany; the number is 121 for all of Europe. The US is playing a leading role in the construction and operation of biorefineries and in providing support to the industry. The Department of Energy's Biomass Program alone is providing support for 29 biorefineries.

The VDI (Association of German Engineers) Technology Center has conducted a study to assess the extent to which biomass and its maximum utilization in biorefineries will replace conventional oil-based production techniques. The study provides information on bio-based production methodologies for 26 precursors (platform chemicals). There are strong indications that production is being migrated to bio-based techniques on eleven of these precursors. To take one example, production capacity for succinic acid and polylactic acid (PLA) made exclusively of biomass is expanding worldwide.

This article is based on the ACHEMA Trend Report "Plants for Plants – Plant Engineering for Biomass Processing". Further information: www.achema.de.

Technical Hurdles and Solutions

To roll out competitive, cost-effective bio-based production on an industrial scale, a number of technical hurdles will have to be overcome. The challenges begin with handling aspects that are closely related to the very nature of biomass. Large quantities have to be harvested, transported and processed. The sheer volumes are not the only challenge for industry. Diversity is another issue which needs to be addressed. The term biomass extends beyond dry bulk solids such as corn and wood chips to include high-viscosity liquids like sewage sludge and liquid manure. Given this level of diversity, different techniques are needed to move the biomass to the intended destination.

Logistics is not the only area where special solutions are needed. Biomass has to be stored between delivery and industrial processing. Spontaneous ignition has been a recurring problem with wood chips. The problem is caused by microbial decomposition in the wood. Poor heat conductivity in the bulk materials tends to catalyze the process, often producing smoldering or even open flames.

Besides chemical oxidation reactions which are the largest exothermic factor in the overall process, the German Materials Research and Testing Agency (BAM) has pointed out that physical and microbiological processes play a part in bulk biomass heat management.

The information has been published in the Agency's biomass storage fire prevention guidelines. For example, water adsorption on the surface of relatively dry solids also raises the temperature when adsorption heat is released.

The need to be very careful is not limited to dry biomass. Building and water management regulations apply to the storage of commercial liquid manure to ensure that overflowing or escaping liquid manure is not released into the sewage system or, even worse, into the ground water. Following conversion, the products are normally highly diluted, often in the form of complex product mixtures which contain constituents that are very similar to each other. The products also contain various residues and waste products.

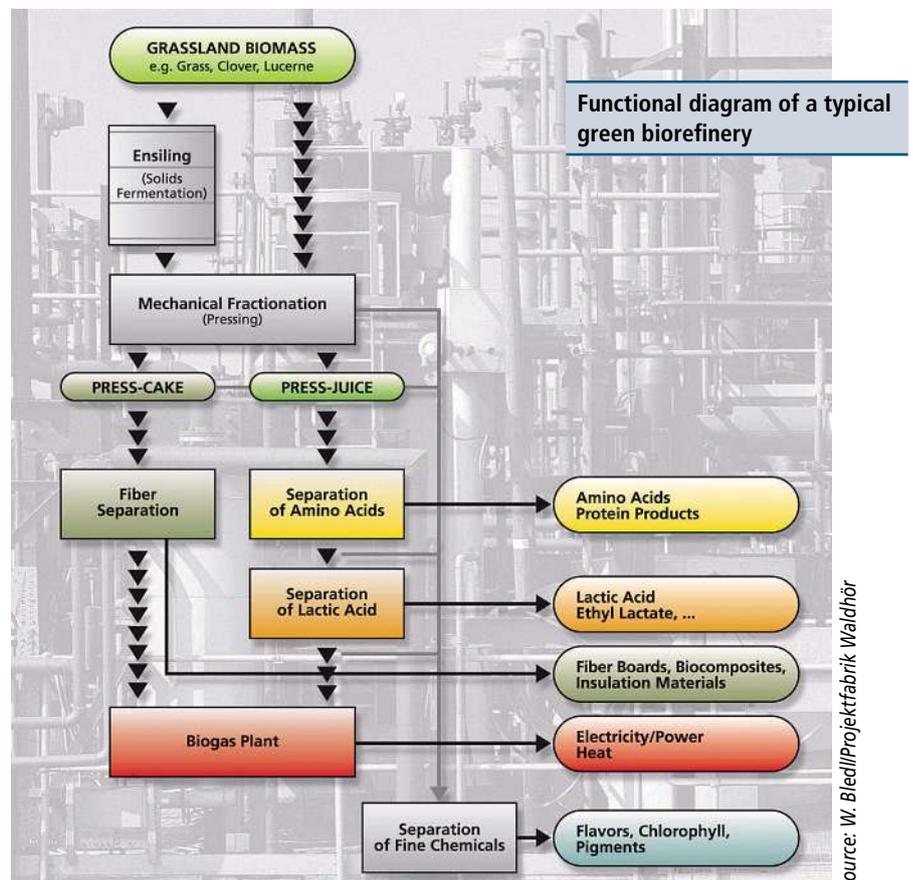
Product purification/downstreaming to meet chemical standards are a big challenge. Large amounts of aqueous solution are normally involved, and the product often still has to be isolated from the organism. Extracting the product from a fermentation broth can often account for 80 percent of production costs, making it a major cost factor in biotech production. The list of additional technological hurdles includes the development of new specific catalysts and biocatalysts. Product inhibition during fermentation can be another problem if high product concentrations are not conducive to the organisms involved. Innovative approaches such as in-situ product isolation or low pH process design can provide the answer. Upscaling from the lab environment can also cause problems. Bio-based processing needs to be combined with conventional chemical techniques. Hybrid chemical production is essential particularly during the early stages of development. Intensive work is underway in the US and

China on polybutylene succinate. The process combines biological fermentation with chemical hydrogenation.

How to Avoid Bio Corrosion

Stephan Prechtel and Martin Faulstich (ATZ Development Center) have published a study which highlights another very real challenge for equipment manufacturers. Biofilms colonize metal, natural stone, concrete and plastic surfaces in equipment which is used for industrial-scale biomass processing or power generation.

Many agricultural biogas systems are made of concrete, and mechanical agitators are used for mixing. The hydrogen sulfide and its by-products (sulfurous acids and sulfuric acid) which form during anaerobic microbiological decomposition of the substrate often cause corrosion to the structure and equipment such as agitators, heat exchangers and cogeneration systems. Biological desulfurization directly in the fermenter





Picture: Fachagentur Nachwachsende Rohstoffe

The makeup of the solid substrates has a major influence on the fermentation process at bio-gas plants. To an increasing extent, standard input materials such as corn silage are being replaced by alternative substrates like manure, grass, straw or, more recently, sugar beets.

is the most common technique for reducing the hydrogen sulfide content in the biogas. Microbiological desulfurization is a very simple process. Capital investment and operating costs are low, and the technique is used in the majority of systems. Under optimal conditions, the desulfurization rate can be as high as 95 percent.

Deposits of elemental sulfur can cause blockage problems in pipes. Fluctuating crude gas concentrations have a negative effect on microbiological desulfurization directly in the fermenter gas chamber.

Corrosion damage can often be avoided by selecting a more suitable method of biogas desulfurization. The following techniques are used in practical application. However, the technical suitability as well as the capital investment and operating costs of the various options have to be evaluated for the specific application.

- Precipitation by directly adding ferric salt
- Caustic rinse
- Adsorption on iron-rich bodies
- Adsorption on activated carbon
- External biological desulfurization in a separate reactor

There are an estimated 7,000 biogas plants in Germany, and many of them have been operating for years without interruption. Most of the equipment at these plants is no longer state-of-the-art. Susceptible parts are wearing out, and experts predict massive repowering, for example with

advanced instrumentation and control systems to facilitate process management. Susceptible parts which are subjected to high stress (e.g. agitators, feed units and cogeneration plants) will be replaced.

Syngas Plants: Preventing Deposits

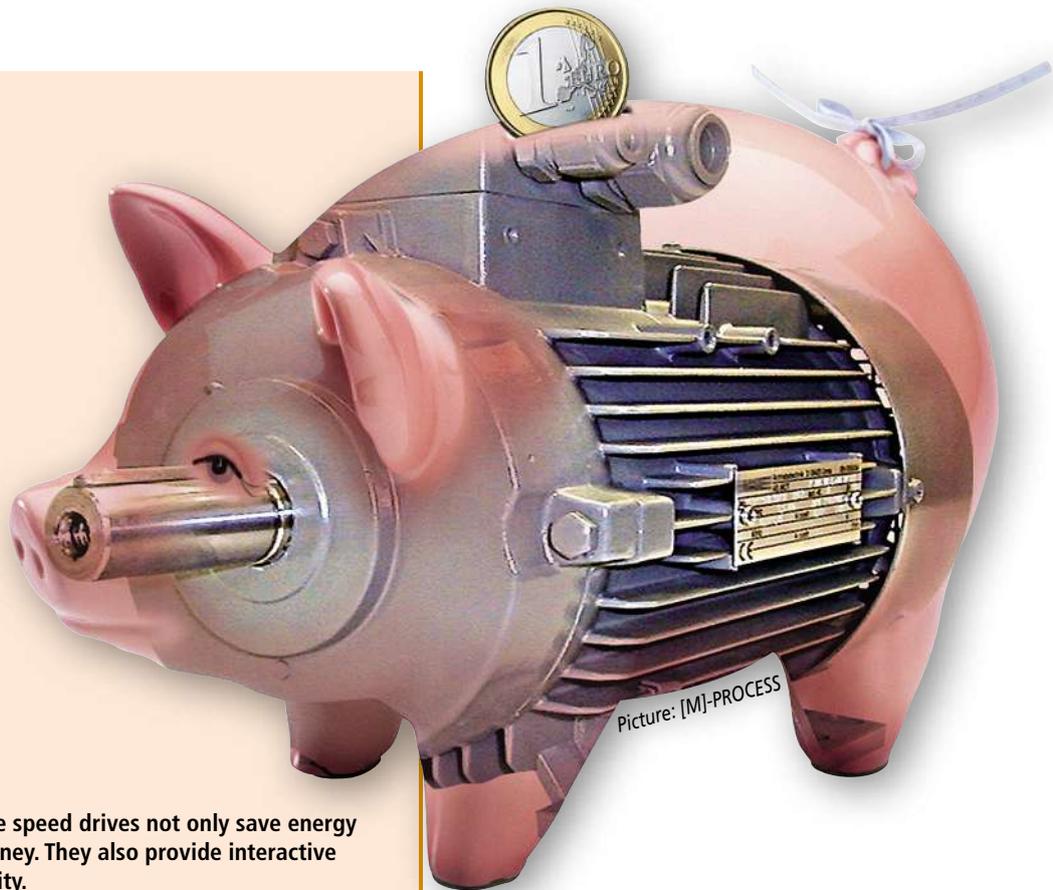
Tar formation is a problem associated with the production of syngas from biomass. The main difficulties are the trouble-free supply of biomass, high coke and tar content in the product mixture and the cost and effort of gas upgrading.

The main problem associated with the use of biomass for Stirling engine applications is the efficient transfer of heat from the biomass combustion flue gas to the working gas in the Stirling engine.

The hot gas heat exchanger provides the interface between the flue gas and the working gas. To ensure high electrical efficiency, the temperature of the flue gas at the inlet to the hot gas heat exchanger should be as high as possible, but this can cause problems resulting from ash deposits in this part of the system. A computer program to calculate heat transfer at the flue gas end of the hot gas heat exchanger has been developed to address the problem. Following extensive engineering and development work, the efficiency of these system components has been improved significantly. An automated gas scrubber for the hot gas heat exchanger is now also available.

Using a nanotechnology-based coating technique, the so called Nanostir Project is taking a different approach to the problem. The objective is to eliminate or greatly reduce slag formation at the hot gas head over a long period of time.

At ACHEMA 2012, exhibitors will showcase new process strategies, better catalysts as well as innovative products which further improve the cost and efficiency aspects of biomass conversion for the production of energy and raw materials. ■



Variable speed drives not only save energy and money. They also provide interactive capability.

Energy Intelligence in Pumps

How do we identify opportunities to save energy? One approach for achieving quick results is to scrutinize and optimize individual components like pumps. At AICHEMA 2012 “energy-intelligence” solutions for pumps will show how users can save money and also enhance process reliability.

Realistic estimates (Motor Challenge Program, Hydraulic Institute) indicate that pumps consume 20–25% of the electricity which is produced worldwide, and the process industry accounts for a quarter of that total. An estimated 490,000 pumps are installed in the German chemical industry alone. The majority of all pump systems currently in operation are equipped with centrifugal pumps. The figure worldwide is estimated to be around 73% and can be as high as 85–90% in specific industries, e.g. the chemical industry.

Very well engineered pumps and optimal configuration of the hydraulic system appear to offer the best route to maximum energy efficiency. Ongoing maintenance can also reduce energy consumption, because wear and aging reduce the efficiency of all types of equipment. Corrosion and deposits increase flow resistance in pipe networks. Leakage in valves and fittings causes pressure losses in the system. Energy efficiency re-

This article is based on the AICHEMA Trend Report “Pumps and Valves”.
Further information at www.achema.de.

search indicates that the energy efficiency of poorly maintained pumps can decrease by as much as 15%.

In practical application, diaphragm pumps are often twice as efficient as centrifugal pumps. However, the efficiency levels which are theoretically possible with displacement pumps are not always achievable, with friction losses being a particular problem.

Friction losses can be broken down as follows: gear unit (5–40%), plunger packing (1–20%), bearings (up to 3% depending on the oil level), churning losses (up to 3%) and the hydraulics (2-x%). Possible solutions are:

- higher efficiency gear units (toothed gearing, belt transmissions);
- improved bearing efficiency (no gaskets, lean lubrication, optimal viscosity);
- lean lubrication with the lowest possible viscosity to minimize churning losses;
- selection of the shortest possible seals with small seal faces.

Effective pulsation management on displacement pumps reduces losses by more than 1%. Under normal conditions, pulsating flow increases pressure losses. Continuous flow saves energy and reduces stress on all system components.

Setting Minimum Efficiency Standards

The European Ecological Design Directive (ErP) requires manufacturers to improve the energy efficiency of their equipment over the entire life-cycle and reduce the environmental impact. Pumps are of course no exception.

The motor regulation (EC640/2009) applies to nearly all motors rated between 0.75 kW and 375 kW as follows:

- Stage 1: as of June 16th 2011 all motors must be IE2-compliant.
- Stage 2: from January 1st 2015 all electric motors rated between 7.5 kW and 375 kW must either be IE3-compliant or IE2-compliant with a frequency converter.

■ Stage 3: from 2017 all electric motors rated between 0.75 kW and 375 kW must either be IE3-compliant or IE2-compliant with a frequency converter.

Minimum efficiency standards have been in effect in the US for years. The proportion of high-efficiency motors (IE2) is significantly higher than in Germany/Europe.

The ErP Directive is based on the simple realization that not using energy is the best solution from both the ecological and economic point of view. A study carried out by the German DENEFF Energy-efficient Business Initiative indicates that energy savings by businesses and households could eliminate the need for electricity generation by ten nuclear power stations.

The standard principles of good pump design (working point close to the optimal pump operating point, hydraulically correct pipe dimensioning) and the technologies which are currently available to reduce energy consumption (efficient motors, frequency converters for speed control, hydraulics designed for optimum efficiency, reduction of losses in the coils and bearings) must be exploited to the fullest extent possible.

The FfE Research Center for Energy Economics has provided some figures for 2009. The investment costs are comprised of the cost of the frequency converter (€ 100–200/kW pump rated power) and installation costs of around € 2000 per pump unit (these are guideline figures only).

Impeller modification is another method which can be used to adapt centrifugal pumps to the specific application and reduce pump energy consumption. Reduction of pump and motor power ratings can cut energy consumption by between 10% and 40%. Modification can cost up to € 1000 depending on impeller size.

Interactive-enabled E-Pumps

Variable speed drives not only save energy and money. They also provide interactive capability. Pumps with sensors and microelectronics

Pump Audits evaluate pump efficiency and the potential for saving energy at a site. A Pump Audit results in an overview of pump performance and suggestions for improvement.



Picture: Grundfos

become actuators which can “intervene” and affect the process flow.

Communication-enabled pumps with parameterization features can ensure that a desired pressure level and volume flow are available in the reactor at a certain point in time or that exactly the right mixture of two substances is added at precisely the right moment.

Compared to mechanical control with butterfly valves, etc., flow rates can be controlled far more accurately and reaction times are shorter when variable speed drives are used. E-pumps adjust the flow rate to match actual demand much faster and with greater precision in response to demand fluctuations. Variable speed pumps are more energy efficient, and they also help stabilize the process.

Overcoming Obstacles

If that is the case, why then have users not taken advantage of all optimization options? There are a number of possible explanations:

- Decisions are based on payback time: at many companies, the maximum payback period is 2–3 years. The payback period however is basically a risk management tool, but says nothing about ROI. NPV (Net Present Value) is the method to use for that purpose.

- Lack of a basic technical understanding: the people responsible for energy management cannot present the information in a way that managers without engineering expertise can understand.

- Spending constraints: approval is not given for any investment that is not absolutely necessary.

- Lack of human resources: opportunities to save energy are understood, but no one has time to take the appropriate action.

- Investment only when faults occur: reinvestment is often only considered when systems actually fail. In such situations, the new system must be available quickly and cost as little as possible. No thought is given to lifecycle costs.

- Failure to allocate costs: many companies only know what their overall energy consumption is. No consumption data is available for individual equipment. In many cases, personnel costs for maintaining old equipment is not allocated to the specific items. Without information on energy consumption and labor costs for the existing equipment, there is no way to identify inefficient equipment, and a financial evaluation of equipment optimization is not possible.

Summary: Manufacturers of pumps often have to compete on price rather than on the operating cost of their equipment. Everyone involved should reach a consensus that NPV provides a better basis for decision-making than the payback period only. ■

The shifting energy base has large implications for the process industries worldwide – what better place than ACHEMA 2012 to discuss it?

Processes for Power – Power for Processes

— DR. KATHRIN RÜBBERDT —

The process industries are not only one of the big energy buyers, they also play a major role in future energy concepts. Whereas large-scale storage techniques traditionally focus mainly on pump storage stations and compressed-air stores, for medium-sized applications chemical storage is becoming increasingly interesting. This includes redox-flow batteries as well as heat store systems. These range from relatively simple sensitive heat stores (like water in residential heating systems) to latent-heat storage where the temperature of the storage medium remains constant to sorption systems based on the temperature gradient caused by adsorption processes e.g. in zeolites.

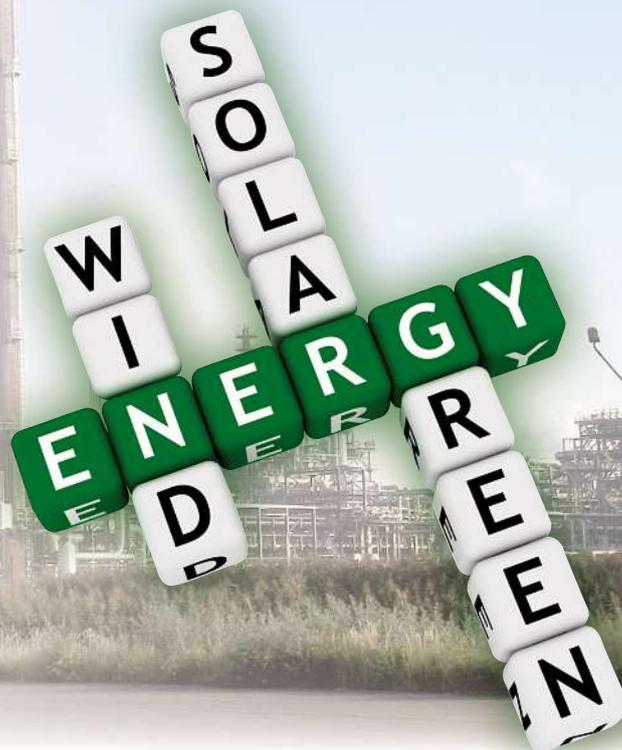
The highest energy density can be reached in chemical storage systems; here, heat is used to split a chemical compound. When the components re-react, heat is released. A well-known example are pocket warmers containing salt hydrates. For industrial applications,

The author is Head of Public Relations of DECHEMA e.V.

Statement on Topic: Storage of Energy – Challenge for Chemical Sciences

“Increasing fractions of fluctuating, renewable energy in our energy infrastructure require storage systems on all time and size scales. In addition, electric vehicles will only enter the market on a large scale, if the storage problem for mobile applications can be solved. Sufficiently high storage densities will only be realized in chemical storage systems, be it in batteries or in form of small, high energy molecules, such as hydrogen, methane, methanol, or others.

Challenges for the chemical sciences are everywhere: novel types of batteries need new electrode materials, new separators, better housing materials, improved electrolytes, and adapted production technology. We need the chemistry around the production, conversion, and storage of molecular energy carriers, for instance, efficient and cheap electrolyzers for the generation of hydrogen. An attractive research and business target for the future is also heat storage, be it for the night hours in solarthermal power plants, or for domestic heating.”



Pictures: PROCESS/MELY

solid-gas systems are very promising as they combine high storage densities with long-term storage.

Special Show “Innovative Energy Carriers and Storage”

Energy generation, storage and use will be a major focus topic of ACHEMA. Right from the opening on Sunday, energy will be a red thread visible throughout ACHEMA. At the core, the special show “Innovative energy carriers and storage” will present new concepts in solar energy generation, photochemistry, hydrogen and battery technology as well as chemical energy storage and concepts for e-mobility. Special tariffs allow for a satellite stand for established exhibitors rooted

in other exhibition groups as well as for the participation of smaller companies or specialized exhibitors taking part in ACHEMA for the first time. The congress mirrors topics like energy storage, but deals also with questions of energy use in chemical and biotechnological processes and increases in efficiency. ■

Prof. Dr. Ferdi Schüth,
Chairman of the Chemical
Energy Research Coordination
Group, supported by
DECHEMA, DBG, DGMK, GDCh,
VDI-GVC and VCI
Max-Planck-Institut für
Kohlenforschung



While the rapid industrial development of China has been arresting the attention of many observers, Brazil offers tremendous opportunities for co-operation and investment.

Growing from *the Shadows*



exporters in the long run. Even today, Brazil is a net oil exporter and among the ten biggest oil supplying countries for the US. The recoverable oil resources are estimated at 13,000 billion barrels.

The Brazilian economy has recovered remarkably well from the dip it took in the global financial crisis 2008-09. The fifth-largest country in the world, Brazil is currently ranked number nine of national economies (in terms of Purchasing Power Parities). For some time now, Brazil has used exports of raw materials and food to finance the development of its own industry. The top five export products in terms of value are iron ore, oils and fuels, transport equipment (specifically aircraft), soy, sugar and ethanol. Manufactured goods count for 40% of total exports; only 14% of these manufactured goods can be classified as "high-tech", according to a report by Deutsche Bank Research.

The plant manufacturing industry is well-structured and includes all sizes of companies. According to the Brazilian Association of Plant Manufacturing, the turnover in 2010 amounted to about US\$ 45 billion; total sales in Brazil summed up to about US\$ 62 billion.

— DR. KATHRIN RÜBBERDT —

Europe is discussing potential shortages of resources — Brazil is seemingly spoilt for choice. Broad agricultural areas and a history in the usage of renewable resources like sugar cane reaching back for about four decades give Brazil a strategic advantage at the threshold of the age of renewable resources. Brazil is the world's second-largest producer of biofuels and largest biofuel exporter. At the same time, Brazil is also an oil country. In 2008, a giant oilfield was discovered in the deep sea off the Brazilian shore. Environmental concerns, not least the experience of the Deep Water Horizon catastrophe in the Mexican Gulf, have so far slowed down the development of this oilfield, but the government is set on overcoming technical and political obstacles and rising to one of the world's large oil

One of the Most Important Nations for the Chemical Industry Worldwide

Brazil is one of the most important nations for the chemical industry worldwide. In 2010, the overall market for chemical products amounted to US\$ 155 billion. Brazil exported chemicals with a total value of US\$ 13.1 billion, an increase of 25.3% over 2009, according to the Brazilian Chemical Industry Association ABIQUIM. Imports increased 29.1% to a total value of US\$ 33.7 billion. The domestic production could not keep pace with the strongly rising national demand especially in pharmaceutical ingredients and crop protection.

Given these preconditions, it may seem surprising that Brazilian growth rates are far from those of other BRIC-countries like India and China. One reason is the lower domestic savings rate, resulting in less available capital for investment. Another is that Brazil is a more mature economy already, having experienced a period of rapid growth from 1950-80, as Deutsche Bank Research states in a report on "Brazil 2020".

Brazil is reacting to its over-reliance on commodity exports and the increasing pressure of Chinese com-

The author is Head of Public Relations of DECHEMA e.V.

petition in the global markets. Politics and industry are set on developing especially the process industries with a focus on "green" products. Brazilian Braskem opened the world's largest "green" polypropylene plant in 2010; German chemical company Lanxess is shifting its Brazilian rubber production to sugar-cane based ethylene.

Favorable Business Environment

The business environment is favorable: After a period of political instability, Brazil has developed a sound political system, supported by a revised social security system. The



Ethanol made from sugar cane (above: harvesting; below: fermented sugar-cane juice flows through a series of distillation columns to produce ethanol)

Pictures: Raizen

perceived shortage of skills in certain areas is addressed by investments in education; the banks are financially sound and well-capitalized. The country plans to spend US\$ 350 million on agricultural biotechnology R&D over the next ten years, straining to close the gap in technological advantage in biotechnology as discussed in the OECD Biotechnology Statistics 2009. The constellation of abundant natural resources combined with a need to develop the process industries and the want for know-how offers very interesting opportunities

for cooperation for companies from all over the world. Brazil is actively looking for partnerships bringing know-how and innovative technologies to the country. This is certainly a player that should not be overlooked. ■

Looking for *Job Applicants?*

To counter the shortage of skilled personnel: specialised recruitment of engineers, scientists and technicians at ACHEMA 2012

In times of shortage of skilled personnel, companies that depend on specialists have to come up with suitable ideas in order to attract highly-qualified personnel. At ACHEMA, companies looking for highly specialised job applicants in the field of engineering and science, have the opportunity to find in a target-oriented way job applicants for their area under thousands of pro-

At the jobvector-Forum companies have the opportunity to open up career perspectives to participating professional visitors and to explain career options and development possibilities.

corporate brand by directly contacting top job-applicants.

It is already the third time that jobvector is represented at ACHEMA, and it always constitutes an audience magnet with the topic of career. "Over 150 participations of companies and the high number of professional visitors in all jobvector career days show that this concept is well-received by employers and job applicants. By being embedded into ACHEMA the jobvector career day on June 21st, 2012 will offer an interesting presentation platform in the respective sector," said Dr. Eva Birkmann, CEO of jobvector.

Two Pillars: Networking and Forum

The core of the event constitutes the "jobvector-Networking". Job applicants can obtain information on career possibilities in companies and get in direct contact with HR managers. This way HR-managers have the opportunity to get an initial personal impression of the applicant and to draw attention to the areas of the company in which employees are urgently needed.

The second pillar of the career days is the "jobvector-Forum". In talks, companies interested in applicants specialised in the field of science and engineering present themselves. Companies have the opportunity to open up career perspectives to participating professional visitors and to explain career options and development possibilities. Often the forum results in completely new perspectives and possibilities for the listeners that they may have never considered before. This way, little known job profiles and career paths, for

fessional visitors. The jobvector career day, which will take place in hall 9.2 at ACHEMA on 21st June 2012, is an ideal platform for it. This sector-related recruitment event is exclusively aimed at scientists, engineers and technicians.

The level of awareness that "jobvector.de" has reached as a specialist job market after over ten years in combination with the experience of over 20 organised jobvector career days, attracts a great deal of highly-qualified personnel in the field of science and engineering to the jobvector career day. Job applicants visit the event, in order to use the direct contact possibilities to HR-managers and to receive exclusive information on career options in the sector. The jobvector career day offers, on the other hand, companies the possibility to increase their level of awareness and strengthen their



Pictures: jobvector

The jobvector career day in Frankfurt will take place on June 21st, 2012 at ACHEMA in hall 9.2, booth E66 (research and innovation area). Interested companies can register by April 23rd, 2012.

For more information:

www.jobvector.de/careerday-aw or by calling +49-(0)2 11-30 13 84-01



example, can be presented in a transparent way. In addition, with programme features such as a real job interview, which is conducted live, the audience is given the possibility to gather impressions of the course of a typical job interview. This programme feature always attracts great interest and guarantees the participating company maximum attention from the target group.

Further Offers

Further offers make the jobvector career day additionally attractive for applicants. The jobvector-jobwall offers current job offers of participating companies and "jobvector.de" for all career stages. Also ACHEMA exhibitors have the possibility to place here current vacancies. Moreover, jobvector staff are available at the career booth for questions pertaining to the topics application and career.

Another important feature of the jobvector career day is the specialist application portfolio checking service, which jobvector offers in cooperation with a recruitment agency. Here applicants can have their application portfolio optimized.

At the jobvector career day HR-managers meet exclusively committed and motivated job applicants, who take their own initiative and want to introduce themselves to HR-managers, gather information and file an application. Among the visitors there are graduates as well as experienced professionals specialised in the field of science and engineering. They intensively prepare themselves with the help of an ac-

companying booklet for the jobvector career day and the companies they want to apply to. In the run-up, participating companies can present themselves in the accompanying booklet, which is available online in advance and distributed during the career day. Besides, a job website maintained by jobvector.de at achema.de makes sure that ACHEMA visitors can find vacancies of exhibitors in the run-up of the trade fair. This way attention is effectively drawn to vacancies and professional visitors come to the jobvector career day in order to file job applications in a target oriented way. ■

ACHEMA Partnering Conference

Almost 4,000 exhibition stands. Small, large, colorful, stylish, down-to-earth, sparkling chromium devices, packaging lines in full run, do-it-yourself experiments, communication corners. About 175,000 visitors. Engineers, chemists, biotechnologists, investors, managers, scientists, technology seekers, potential future employees. For almost every technological question there should be the right contact – but how do you find him? How can you identify who might be interested in your technology offer or who could supply the equipment you require for your latest project? The ACHEMA Partnering enables you to research the full breadth of exhibitors and visitors looking out for specific offerings or seeking cooperation partners.

Partnering is a well-known tool in the life sciences community, but so far not very common in the process industry. The idea is simple: Whoever is on the look-out for potential cooperation partners

registers in the web-based partnering tool. Here he can also enter his specific interests supported by structured qualification criteria. In a personalized agenda, time slots can be marked as “booked” for congress or other activities. Each participant can search the database for other people who match his interests. The search includes the websites and profiles of all registered participants. If he identifies an interesting contact, he sends an inquiry for a meeting. The other person is informed via e-mail or SMS and can agree or decline; if he agrees, the system schedules a half-hour meeting based on the available meeting slots of both discussion partners. Meetings can take place during ACHEMA at a stand or in a designated partnering area. The partnering system will open two months before ACHEMA and stay available for one month afterwards. ACHEMA Partnering will help visitors and exhibitors to optimize their ACHEMA schedule and to achieve as many high-quality meetings as possible. Registration to the partnering conference gives access to thousands of participants looking for cooperative development deals and business partnerships.

ACHEMA partnering is free for exhibitors. Information on the fees for visitors and detailed registration procedures are available on <http://www.biobasedworld.org/achema-partnering>



On the Move – ACHEMA App Keeps You Up-to-date

With more people than ever using smart phones, people are accessing media on the go like never before. ACHEMA takes account of this trend and provides a contemporary mobile application enabling visitors to have access to the most important information when out and about. Key features of the ACHEMA App include:

- All ACHEMA exhibitors with address details, hall/stand location and short company profile
- Filter and search features including company names, products, exhibition groups, countries
- Interactive plans covering exhibition grounds and hall layouts
- Congress programme with daily schedules of lectures and topical filters
- Bookmarking of exhibitors and events
- General information on venue, opening hours, entry tickets etc.

Complementing the ACHEMA online website as your well-proven information source, the all new ACHEMA App will be available in two versions for smart-

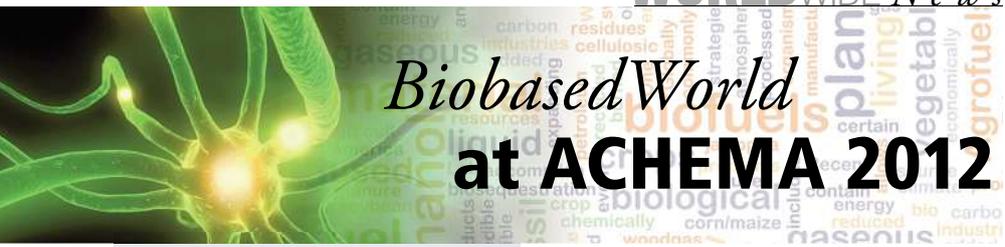
phones: A native Apple iPhone app (from iOS 4.0) with optional daily update of mutable contents and a Web App, displaying information on exhibition and

congress online (using Internet or 3G access without need of permanent storage of data on your mobile device).

Besides the mere informational function mobile applications already play a vital role in many businesses strengthening their marketing efforts. The chances of addressing relevant target groups in a very direct and personal way are obvious and continue to rise. Many companies already keep themselves locked into their customers, even when they're on the move. With this in mind the ACHEMA App will also offer various opportunities for exhibitors to place individual advertisements to reach their audience. Time to move forward and to be there!

For more information on advertising in the ACHEMA App please contact: **DECHEMA e.V.**
Dr. Michael Schulte
+49 69 7564-165
editorialteam@dechema.de
@ACHEMA_2012





BiobasedWorld at ACHEMA 2012

...a new format unites established and new players in the bioeconomy.

Biorefineries, biobased products, renewable resources, industrial biotechnology – the bio-based economy is not a buzzword, but living reality. Not only is a new biotechnology industry with new players entering the field, but established industries like the chemical and other process industries are undergoing a rapid transformation. New raw materials and innovative biotechnological processes call in turn for adjustments in equipment, instrumentation, control and automation technologies and many more.

ACHEMA 2012 reflects this development within the platform "BiobasedWorld at ACHEMA". It offers the unique chance for established industry players and new market entrants as well as scientists and investors to meet in one place and discuss state-of-the-art technologies and products.

The new concept acknowledges the fact that biotechnology and renewables play a part in virtually all exhibition groups. Therefore, while offering a physical hotspot in form of the BiobasedWorld forum in Hall 9, BiobasedWorld is not constricted to a certain area, but aims at making the biobased economy visible throughout the exhibition.

The BiobasedWorld forum will act as a center of gravitation, offering a platform for special events such as the technology transfer days. Technology transfer days provide a compact format for the presentation of market-ready technologies to potential partners and investors; in ten-minute presentations, researchers may introduce their offering to the audience.

The ACHEMA congress also addresses the bio-based economy with several focus sessions. Topics include e.g. Bioprocesses (covering

the complete value chain from cell culture via reactors to downstream processing), Single Use Reactors, Bionics, Food Biotechnology, Biorefineries and Novel Biocatalysts. Additional workshops and events include a presentation of German Bioindustry 2012 Leading to Bioeconomy and an accelerator forum of the European SME-oriented BIOCHEM project featuring a Business Model Competition and a Venture Capital Day. Further dedicated sessions and workshops will address questions like public funding, investment opportunities and appropriate business models.

Facilitating Networking

To facilitate networking, ACHEMA has for the first time installed a partnering scheme open to all exhibitors and visitors within and beyond the BiobasedWorld. Exhibitors and visitors can register two months in advance of the event. The system matches cooperation requests and offers and creates an individual meeting schedule; meetings may take place either at exhibition stands or in a dedicated partnering area.

The bio-economy is a truly international project that will result in new cooperations and division of work across the globe. Companies and researchers wishing to participate in this process should use the chances a truly global platform like ACHEMA can offer by bringing the biobased world to Frankfurt. ■

The world is becoming bio-based, and the process industries play a vital role in this transition. BiobasedWorld at ACHEMA is a platform for exhibitors, visitors, scientists and investors in the bio-based economy. In addition to the exhibition and the congress programme the BiobasedWorld concept provides a unique opportunity to meet and network. A partnering platform and technology transfer days support the identification of potential partners and the scheduling of face-to-face meetings.

Additional information is available at:
www.achema.de/biobasedworld

International Certificate and Congress on Sustainability Science & Engineering

The American Institute of Chemical Engineers, AIChE, and DECHEMA have launched a collaboration within the sustainable technology area. One goal of this collaboration is to develop sustainable standards for engineering. ACHEMA exhibitors can let have their services and products checked in respect to these standards and may receive a certificate. The AIChE has formed an expert group who has developed a questionnaire which delivers detailed information on topics like product stewardship, degree of innovation of the product, or service regarding sustainability.

During ACHEMA there will be a sustainability congress integrated in the scientific program which is jointly organized by AIChE and DECHEMA. The purpose of the congress is to provide a common platform for practitioners of various physical and ecological sciences, engineering fields, economics, and social sciences.

This common platform enables participants to exchange emerging ideas about ways and means of protecting the environment and its resources so that humans can achieve sustained economic growth and societal benefits through generations. The focus of this congress is managing natural resources sustainability from a systems perspective using scientific and engineering innovations.



More information can be found on <http://www.icosse.org>

ACHEMA Delegate for Turkey



With solid growth rates around nine percent over the past years, Turkey is about to become a rising star and hotspot for the chemical process industries. Anything but surprising, this trend shows at ACHEMA as well: The country is in the top five in terms of increasing exhibitor figures.

Hence DECHEMA is particularly proud to announce that ACHEMAworldwide events are now being represented in Turkey through Mr Ferit Orbay.

Ferit Orbay has an excellent reputation in international consulting for technologically demanding services, and a long career with some of the big players in our industries. He holds an engineering degree from the University of Darmstadt, lives alternately in Turkey and Germany – and feels at home in both worlds. Welcome to the ACHEMA team, Mr Orbay!

Contact:

Mr Ferit Orbay
Emel Sokak 3
Iclevant
34330 Istanbul
Turkey
Phone: +90 5 37/5 40 52 59
Mob: +49 1 52/03 39 91 85
e-mail: ferit@orbay.net

International Events Organized by DECHEMA

- December 5–6, 2011:** 7th Status Seminar on Chemical Biology, Frankfurt am Main/Germany
- January 24, 2012:** Synthetic DNA: Writing with the letters of life, Frankfurt am Main/Germany
- February 2–3, 2012:** Functional Genomics and Proteomics – Applications Molecular Diagnostics & Next Generation Sequencing, Frankfurt am Main/Germany
- February 20–22, 2012:** 12th International Conference on Microreaction Technology, Lyon/France
- February 26–29, 2012:** European Workshop on High-Throughput Developments and Applications, Wildbad Kreuth/Germany
- March 14–16, 2012:** 3D CellCulture 2012, Zurich/Switzerland
- June 11–13, 2012:** 15th Annual Conference of the European Biosafety Association, University of Manchester
- June 18–22, 2012:** ACHEMA 2012, Frankfurt am Main/Germany
- July 1–6, 2012:** 15th International Congress on Catalysis 2012, Munich/Germany
- September 9–13, 2012:** EUROCORR 2012 – The European Corrosion Congress, Istanbul/Turkey
- September 10–13, 2012:** 7th International Conference for Conveying and Handling of Particulate Solids – CHoPS 2012, Friedrichshafen/Germany
- September 16–19, 2012:** 3rd International Conference on Metal-Organic Frameworks and Open Framework Compounds, Edinburgh/United Kingdom
- September 16–20, 2012:** European Adhesion Conference – EURADAD 2012, Friedrichshafen/Germany
- October 7–10, 2012:** 32th International Symposium on the Separation of Proteins, Peptides and Polynucleotides (ISPPP) & 9th European Symposium on Biochemical Engineering Science (ESBES) & 4th International Symposium on Biothermodynamics (ISB), Mainz/Germany

Further Information:

DECHEMA e.V., Congress Office

Theodor-Heuss-Allee 25, 60486 Frankfurt am Main/Germany

Phone +49 (0)69 7564-129/-333/-249; Fax +49 (0)69 7564-176

E-mail tagungen@dechema.de Internet www.dechema.de

Imprint

Editorial Staff

- Editor-in-Chief:** Gerd Kielburger ☎ +49 (0)9 31/4 18 - 2536, gerd.kielburger@vogel.de
- Editor:** Dr. Jörg Kempf ☎ +49 (0)9 31/4 18 - 21 73, joerg.kempf@vogel.de
- Editorial Assistant:** Gabriele Ilg ☎ +49 (0)9 31/4 18 - 21 07, gabriele.ilg@vogel.de
- Editorial Office:** Vogel Business Media GmbH & Co. KG, Max-Planck-Str. 7/9, 97082 Wuerzburg, Germany, Telefax +49 (0)9 31/4 18 - 27 50, redaktion@process.de www.process.de, www.process-worldwide.com
- Layout:** Dieter Kansog
- Production:** Werner Wolz, ☎ +49 (0)9 31/4 18 - 24 79

Publisher

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- General Manager:** Stefan Rühling
- Advertising Manager:** Reiner Öttinger ☎ +49 (0)9 31/4 18 - 26 13, (responsible for the advertising section) reiner.oettinger@vogel.de

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