

FRAUNHOFER IN INDIA NEWSLETTER - ISSUE 1 / 2014



FRAUNHOFER IAO'S INDUSTRY 4.0 MODEL SHOWCASED AT HANNOVER MESSE 2014

"Cost effective pace-setting solutions is the key to success in Indian market"

Mr. Heim on light-weighting initiatives suitable for Indian market

Page 6-7

Clay has healing powers

Fraunhofer IZI and FIM Biotech GmbH to develop an effective therapeutic agent to treat chronic kidney disease

Page 9

"Innovation is at the core of BHEL's activities"

Mr. Bhutani talks about BHEL and its association with Fraunhofer

Page 12-13

3rd FIT platform 2014 on "Energy Efficiency and Renewable Energy"

The two-day event will kick off on 18th Nov 2014 with high profile panel discussion

Page 14

Content

Fraunhofer showcases its expertise at major events	3-5
"The World from a different angle: Vehicle Light Weighting in India" - Mr. Heim, Fraunhofer LBF speaks about his Institute's competencies and its importance to the Indian market	6-7
Fraunhofer Spectrum: New and Emerging technologies	8-10
The MP3 Wizard!	11
"BHEL laid strong emphasis on R&D" - An interview with Mr. O. P. Bhutani, Principal Adviser (E, R&D), BHEL	12-13
Forthcoming Activities and Events	14
Profile: Fraunhofer & Contact	15

TECHNOLOGY AND INNOVATION: LONG TERM STRATEGY FOR FASTEST GROWTH

“Fraunhofer sees itself as a frontrunner in igniting ideas and stretching boundaries so that the technology curve remains steep. At the recent Hannover Industry Fair, the Fraunhofer Stands in four different halls, demonstrated among several exciting ideas, the Factory 4.0 Model incorporating ergonomics, efficiency and energy. Another interesting model was “sustainable cities” where the interplay of several factors such as mobility, security, energy, information technology and security can be addressed in a multidisciplinary manner, to enable cities become more citizen-friendly, ensure work-play-life balance and indeed be sustainable. Of particular interest is the fact that these are not merely research ideas, but technology solutions that can be implemented straightaway.”

*Ms. Anandi Iyer, Head,
Fraunhofer Representative
Office India*

Dear Readers,

Most often the one fact that distinguishes leading companies against their competitors, is their long term strategy to invest in Technology and Innovation as key differentiators. Companies that occupy pole position, align their corporate strategy to their R&D strategy, and create resources to implement and deliver the assigned objectives. While this seems simple, the fact is short term gains by buying technology off shelf or in-licensing are too tempting and cost-attractive, thereby providing companies with little motivation to opt for the more intensive path of developing in-house research capability. Innovation should be seen as an *investment*, not a *cost* in the company's strengths to survive against their competitors and indeed steam ahead to break through market share and achieve higher profitability. Apple has set benchmarks in this regard, and so have many other pioneering companies such as Philips, Bosch and Bayer to name a few. Often one hears the argument that the customer is not willing to pay for innovative offerings, and hence it is difficult to justify spending on R&D. However, companies that are driven by innovation have captured the imagination of customers and left their followers far behind in market share. For sure, if the product is innovative *and* cheaper, that would be an ace! Take the case of Hindustan Lever, a company renowned for its unrelenting pursuit of innovation and research. During the first quarter of 2014, the domestic consumer business grew at 10%, with 4% underlying volume growth, ahead of market. During FY05–13, HUL's revenues increased at a CAGR of Sales (USD billion) 12.0% to USD4.9 billion from USD2.6 billion. Now the interesting fact: During FY12, the company spent USD336 million in R&D, up 62% from the USD218 million spent in FY11. The investments in research brought rich dividends in a time of low growth, thereby enabling the company to buck the trend. Lupin, the pharma giant, grew at a rate of CAGR of 25.8% in FY13, with advanced formulation accounting for nearly 52% of its revenues in FY12. There are several stakeholders who can play an important role in the innovation lifecycle, to compress the time from lab to market, be it Government, Universities, Research Institutes, or Industry.

We are delighted that in our journey of catalysing innovation in India, we are graduating from partnering on individual projects to more strategic R&D support. We now are working with some of the leading companies in India, as their technology partners to define and implement medium to long-term technologies strategies. These companies have realised that Innovation needs to be built into the DNA of a company and that process requires foresight, commitment, and resources. Fraunhofer helps by developing technology roadmaps, benchmarking innovation capabilities of companies and aligning the company's existing and planned resources, technology options and future growth. The calibration of these factors is extremely critical to make the appropriate investments in research that infuse robustness and agility in the organisation. Finally once a company has reaped the dividends of investing in innovation, there is simply no looking back. From employee exuberance to customer delight and burgeoning profits, the results are exhilarating!

Happy Reading!
Anandi Iyer



Fraunhofer showcases its expertise at major events

The last few months have been very busy and encouraging for Fraunhofer in India. Fraunhofer took part in various high-profile events and some of its top experts visited India for exploring collaborations with leading business houses in the automotive, energy and entertainment sectors.

Fraunhofer experts as distinguished invited speakers share their knowledge, opinion and experiences

In October 2013, TERI- BCSD's annual flagship event - The 11th Leadership Summit for Sustainable Development witnessed participation from over 120 delegates, including Indian and global business and thought leaders. The participants reflected on the challenges faced by businesses in the context of mainstreaming environmental and social sustainability in their business strategy. Dr. Andreas Sterzing, Fraunhofer Institute for Machine Tools and Forming Technology IWU was invited to be a part of the panel discussion on "Implementing Sustainable Development in Business - The Practitioners Perspective," where he shared his views on sustainable and resource efficient production.

The Intersolar India Exhibition and Conference held in November 2013 in Mumbai showcased the latest developments in the fast-growing India's solar market as well as industry trends around the globe. The exhibition witnessed 700 attendees exchanging the latest information on topics such as photovoltaic production technologies, energy storage and solar thermal technologies. Dr. Jochen Renstch, Fraunhofer Institute for Solar Energy Systems ISE participated in this event and met several existing and potential clients in the solar energy field.

Fraunhofer also made its presence felt at FICCI Frames this year. Frames is a three day global convention covering the entire gamut of Media & Entertainment industry attended by nearly 2000 Indian and 800 foreign delegates. Mr. Heiko Sparenberg and Mr. Alexander Zink of Fraunhofer Institute for Integrated Circuits IIS were invited as panelists. Mr. Sparenberg also visited and met with some of India's top production houses based in Mumbai for exploring potential collaboration.

Fraunhofer showcases latest technologies through its exhibits

Fraunhofer in India has catered to a wide client base of top automotive component companies as well as manufacturers for the past several years. In order to continue its engagement with the Indian automotive market, Fraunhofer organised its stand at various trade fairs in India.

In December 2013, Tata Motors organized first-of-its-kind "Light-weighting Conclave." It was a two

1. Fraunhofer team posing with a memento at TATA Light-weighting conclave

2. Experts interacting with visitors at Fraunhofer stall, IMTEX 2014, Bangalore



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Fraunhofer delegation visits to India:

- Dr. Jochen Rentsch, Fraunhofer ISE
- Mr. Frank Treppe, Dr. Raoul Klingner and Dr. Birgit Gebler, Fraunhofer-Gesellschaft
- Dr. Frank Riedel, Mr. Markus Puschmann, Mr. Sven Schiller, Dr. Andreas Sterzing and Mr. Peter Blau, Fraunhofer IWU
- Dr. Ralph Wilken and Mr. Franz-Josef Wöstmann, Fraunhofer IFAM
- Mr. Gunther Göbel, Fraunhofer IWS
- Mr. Rüdiger Heim and Mr. André Neu, Fraunhofer LBF
- Mr. Daniel Heinen and Dr. Kristian Arntz, Fraunhofer IPT

3&4. Experts from various Institutes at Fraunhofer stall, Auto Expo 2014 and during Innovation Workshop

day programme in Pune that provided a unique opportunity for various suppliers to share a platform and ideate on weight reduction in vehicles. However, Fraunhofer was the only R&D organization that was invited to present its competencies. Mr. Sven Schiller of IWU, Mr. Franz-Josef Wöstmann of Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM and Mr. Rüdiger Heim of Fraunhofer Institute for Structural Durability and System Reliability LBF were the keynote speakers. Various components on light weighting were also put to display at Fraunhofer stall.

The 12th edition of Auto Expo this year in New Delhi was held at two different venues with clear focuses of automobile (Auto Expo 2014 – Motor Show) and auto-components (Auto Expo 2014 – Components). Auto Expo Components had a special emphasis on technological innovations in the areas of safety, environment and fuel efficiency. Several experts from Fraunhofer institutes namely IWU, IPT, IAO and LBF were present with their technology exhibits. They also conducted focus tech talks on path breaking technologies to a select group of audience during the trade fair.

IMTEX Forming 2014 which was held from January 23-28, 2014 at BIEC, Bangalore aimed to bring the focus of the Indian metal working towards the world of forming technology. Fraunhofer through its stand at the fair was represented by Institutes namely IWU and IPT. Dr. Andreas Sterzing, Mr. Peter Blau of Fraunhofer IWU and Mr. Daniel Heinen of Fraunhofer Institute for Production Technology IPT were also invited to speak at the International Seminar on Forming Technology organised by Indian Machine Tool Manufacturers' Association (IMTMA). About 400 delegates from 140 companies, representing a wide cross section of the metal working industry participated in this seminar. A separate roundtable meeting with Fraunhofer experts and key people of IMTMA was also held to have a first level discussion on the technology road map.

Visitors of all the above trade fairs thronged the Fraunhofer stand, which featured latest technologies developed by the participating institutes. Many of them who interacted with German experts even expressed interest for collaboration.

Enabling partnerships through innovative workshops

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI) and Fraunhofer signed a path breaking cooperative R&D agreement in the field of automotive technologies way back in 2011. This partnership was a result of the dialogue between the Indian Core Group on Automotive R&D (CAR) and Fraunhofer. In continuation of this collaboration, the third MultiJoin Workshop was held at Indian Institute of Science (IISc) Campus, Bangalore from 27-29 November 2013. Distinguished experts from both ARCI and Fraunhofer took part in this workshop.

For more than several decades now, the Mahratta Chamber of Commerce Industries and Agriculture (MCCIA) has been playing a significant role in accelerating the industrial and economic development of Pune region. In December 2013, MCCIA jointly with Fraunhofer conducted a half-day workshop



on “Automotive Durability Growth – A Process Oriented Toolbox for Resource and Cost Efficient Products.” Mr. Heim of Fraunhofer LBF presented topics which focused on Product Design, Testing Systems and Composites to a select group of audience representing the automotive component manufacturers in Pune.

Fraunhofer in association with the Automotive Component Manufacturers Association of India (ACMA) proudly announced the launch of Innovation Workshop focusing on the topic “Nurturing Innovation Culture in Indian Industry.” The two day workshop which was held concurrently with the Auto Expo 2014, focused on Innovation Management in an organization and the enormous scope for innovation available in the areas of Composites and Polymers, Light Weighting and Tool & Die Making. Dr. Manfred Dangelmaier of Fraunhofer Institute for Industrial Engineering IAO, Dr. Kristian Arntz of Fraunhofer IPT, Mr. Heim of LBF and Dr. Sterzing of IWU shared their insights on the latest innovations and technological trends through case study presentations, problem solving approaches and best practices followed worldwide. The workshop saw a strong industry attendance of nearly 40 participants.

Thin film coatings and surface engineering have become an integral part of many biomedical devices. In an attempt to discuss the technological advancements and more importantly foster groups to pursue research in the field of coatings & surface engineering for medical applications, an International Workshop on Coatings and Surfaces for Biomedical Engineering (IWCSB 2014) was organised in February 2014 at IIT Madras, Chennai. Prof. Wolfgang Diehl, Fraunhofer Institute for Surface Engineering and Thin Films IST and Dr. Andreas Holländer, Fraunhofer Institute for Applied Polymer Research IAP who are experts in surface technologies were the key invited speakers to this workshop. Prof. Diehl and Dr. Holländer also presented at a seminar on “Surface Coating Technology” which was jointly organized by Fraunhofer and CMTI in Bangalore. This seminar was followed by interactive sessions and was attended by more than 80 participants who were from industry, research labs, strategic sectors and academia.

High level delegation visits to Fraunhofer office in India, continued this year as well. During the visit of Mr. Maximilian Metzger, Deputy Director General, International Cooperation, BMBF in March 2014, an exclusive roundtable discussion was organized with German companies involved in R&D in India to understand the challenges and opportunities faced by them.

Fraunhofer is gradually moving into a more strategic and long term partnership with its clients, thus maintaining its strong foothold in the Indian market.

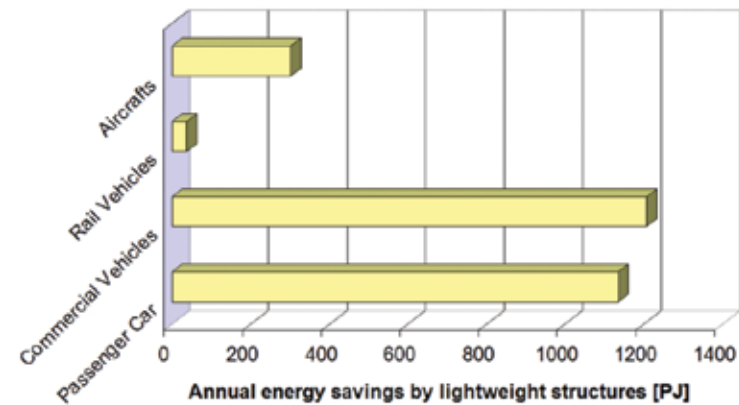
- Fraunhofer delegation visits to India:**
- Dr. Andreas Reuter, Mrs. Antje Wagenknecht and Mrs Britta Rollert, Fraunhofer IWES
 - Mr. Michael Deynet and Mr. Christian Webel, Fraunhofer IESE
 - Dr. Manfred Dangelmaier, Fraunhofer IAO
 - Prof. Dr. Karlheinz Brandenburg, Fraunhofer IDMT
 - Prof. Wolfgang Diehl, Fraunhofer IST
 - Dr. Andreas Holländer, Fraunhofer IAP
 - Mr. Heiko Sparenberg and Mr. Alexander Zink, Fraunhofer IIS

5. Prof. Diehl presenting on surface technologies at a seminar jointly organized by Fraunhofer and CMTI

6. Mr. Sparenberg during a panel discussion at the 15th FICCI Frames 2014 in Mumbai

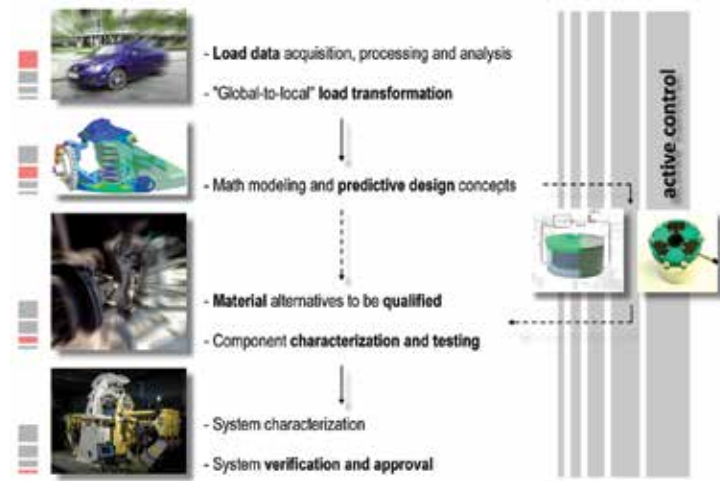
Improvement by mass reduction of 100 kg per vehicle

Significant annual energy savings from road transportation



Data from: Heiers, LCA case studies – 2006

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The World From A Different Angle: Vehicle Light Weighting In India

Mr. Rüdiger Heim – Director of R&D division “Structural Durability” at Fraunhofer LBF – was a keynote speaker at the TATA light weighting conclave in Pune in December 2013. He talks about LBF’s competencies in Product Design, Lightweighting and Design Optimization and its relevance to the Indian automotive market.

Fig. 1 – Annual energy savings by mass reduction of the global fleet

Fig. 2 – From road load data acquisition to validation testing: steps towards product optimization

Fig. 3 – Adaptive side impact stiffener to enable B-pillar weight reduction

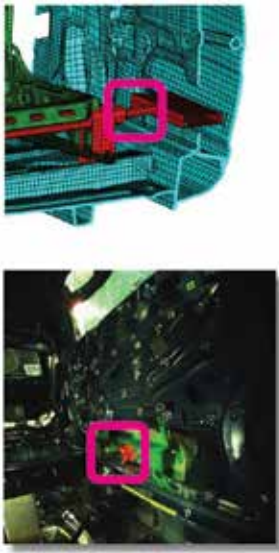
Fig. 4 – LBF full vehicle road simulator for early stage approval testing

By 2016, India will exceed every major European market in automotive sales, making India the 4th largest automotive market by volume in the world. And different to our environment, the number of 2- and 3-wheelers is so much higher, giving the impression of a truly diversified road transportation system in India. Indeed, India is moving in a different way – that can be the reason for Werner Heisenberg to state “*after the conversation about Indian philosophy, some of the ideas of Quantum Physics that had seemed so crazy suddenly made much more sense.*”

Considering today’s global fleet for passenger and freight transport, the impact of weight reduction becomes obvious by looking at the numbers which could be saved annually, if every means of transport would be just reduced by 100 kg (fig. 1): because of the comparatively large number of cars and CV’s, their effect on global CO₂ footprint is extraordinary huge. Today there’re more than 25 mio. cars and trucks running on roads in India, a number which makes it clear that there’s an immediate need for improving energy efficiency by lightweight initiatives.

A key to success in the Indian market is to approach cost effective pace-setting solutions. Consequently I stated clearly in my keynote speech “*do not forget steel materials when looking for light weighting.*” But India is far-off from being aligned to frugal engineering only: it was announced that TATA Motors wants to build a family of world-class passenger cars, which will all be based on a new, flexible architecture dubbed the Advanced Modular Platform (AMP).

Hence lightweight initiatives have to deal with more than just the material selection: Fraunhofer LBF introduced a structured process for creating lightweight products, which starts by top-level decisions related to targets and constraints, and comes through fundamental load mechanics to the final step for verification and validation. In the automotive industry, the targets have to be defined carefully: beyond any functional target there’re always requirements for operational life and reliability. Hence the path towards light weighting starts by the definition *how long* the product will be in service,



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and *which effects will be cumulated* within that time. The better the operational profile is defined, the more successful a product can be designed. Typically body and chassis components of a vehicle aren't aligned to regular maintenance or repair, so all those components have to pass durability requirements. Hence, adequate vehicle lifetime targets help to optimize the material usage by design and reliability.

To generate representative operational data, wheel force transducers are mounted on the car instead of the original wheels. Thereby the actual loads to the structure can be examined and analyzed as an input for the design process subsequently (fig. 2). As mentioned in my keynote, *once the loading is known, you can work on an optimal design.*

Today, product development is led by predictive engineering eliminating the need for early prototype stages, and computer aided technologies are applied to novel concepts including multi-domain simulation. Whenever traditional solutions are limited with regard to mass efficiency, so-called *smart systems* can lead to significant improvements: here a new class of materials provide unique capabilities with regard to actuation technology. As an example, it was shown that an ultra-fast actuator, based on *shape memory alloy (SMA)*, activated a lateral stiffener just before a side impact. By means of such an adaptive safety feature, the B-pillar intrusion was significantly reduced, or – alternatively – the B-pillar structure can be down gauged without compromising the baseline crashworthiness (fig. 3).

By being adaptive in real time – that is called *adaptronics*, and Fraunhofer LBF is the leading organization for this technology – weight reduction can be realized for many NVH related applications as well, simply by eliminating material and layers related to vibration damping.

Mastering the challenges of light weighting typically means to use new materials, such as high strength steel and cast iron grades, aluminium or composites. Combining the benefits of each individual material for a complex product then leads to *multi-material design* that is a clear direction for future light weighting. There, an in-depth knowledge about the material properties as well as reasonable joining technologies are key to success. Hence material characterization and component & system testing are mandatory to create the information needed for product optimization. A cost and time efficient verification & validation process is enabled by accelerated life testing using laboratory test rig hardware (fig. 4). Again, Fraunhofer LBF is a leading organization in durability testing: service load simulation guarantees good agreement to real load-time-histories and gives direct feedback regarding the level of reliability prior to market introduction.

Since Fraunhofer LBF is combining expertise about load mechanics, materials, design & simulation and prototyping & testing, a broad range of innovation & product development support for light weighting can be addressed.

“The knowledge about design, materials and production technology makes Fraunhofer an ideal partner for the Indian automotive industry. That was shown by the contributions from IFAM, IWU and LBF to the TATA light weighting conclave 2013 impressingly. This event opened a new chapter of OE/supplier interaction with regard to an approach for mastering vehicle weight reduction: getting suppliers and partners involved and create ideas for novel lightweight solutions for future vehicles. Thanks to the initiative of the Fraunhofer representative office in Bangalore and Ms. Anandi Iyer, Fraunhofer was the only R&D organization that was invited to present ideas and concepts.”

Mr. Rüdiger Heim, R&D Division Director - Structural Durability, Fraunhofer LBF



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Fraunhofer Spectrum: New & Emerging Technologies

1. Little larger than a shoebox, the demonstrator was developed as part of the IRLSENS project. It is a quick and automated way to analyze water samples at the waterworks itself. © Martin Wagenhan / Fraunhofer IAF

2. Clamping elements attach a metal part in car body assembly. A new device takes over the parameters set in the pilot production run, and makes the production process faster and more flexible. © Fraunhofer IWU

3. Based on naturally occurring Friedländer clay, shown here in its raw state: A new agent in the treatment of chronic kidney disease. © FIM Biotech GmbH

Lasers offer an automated way to test drinking water

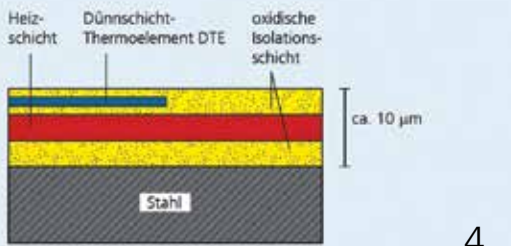
Researchers from the Fraunhofer Institute for Applied Solid State Physics IAF in Freiburg have developed a technology called “Quantum Cascade Laser” – a particular type of infrared laser – which forms the core of an analysis apparatus that allows drinking water to be sampled automatically at the waterworks itself. “The equipment samples the water for dangerous substances at the waterworks itself in the course of routine operations, and allows for a rapid response,” says Dr. Frank Fuchs. Dr. Fuchs is Fraunhofer IAF coordinator for the IRLSENS project, which is funded by Germany’s Federal Ministry of Education and Research (BMBF). Fraunhofer IAF’s quantum cascade laser produces light that is up to 1000 times more concentrated than the silicon carbide thermal emitters used in the lab to date. Infrared radiation – which is at longer wavelengths that the human eye does not register – can be used to analyze impurities in the water. The measurement system is only a little larger than a shoebox, works automatically, and requires hardly any maintenance. A demonstrator has already successfully undergone initial practical testing.

Car manufacturing – fast track towards mass production

More and more varieties of automotive models are penetrating the market, product lifespans are getting shorter, and energy costs are soaring. Above all, the protracted ramp-up time in auto body assembly are causing problems for manufacturers: They have to adapt production systems to each of the new parts and assemblies, which is highly time-intensive. In order to put together individual elements, such as a door or a side panel, the manufacturers clamp the individual parts into model-specific clamping devices and weld them together for which precision is absolutely critical. The new device engineered at IWU allows already determined parameters to be directly transferred to serial production. “We hope to be able to reduce the start-up times by up to 50 percent,” says Marco Breitfeld of Fraunhofer IWU in Chemnitz. The procedure used is called “try-out,” and is already applied to the reshaping process at the pressing plant. Special try-out presses determine, for example, the regulating variables for quality production beyond the serial process already – without interrupting the production process. The presses simulate the process parameters and the production environment of the regular system. Now, the scientists have transferred the process to car body assembly. The IWU can also unlock the potential for lighter weight using this process. They can also simulate the rigidity of the individual components and clamping elements. They test the limits of the system and determine how much weight can be saved without compromising the stability of the construction.



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Treating chronic kidney disease using clay minerals

When suffering from renal failure, the body is unable to filter out phosphates in sufficient quantities, and the resulting excess is then absorbed into the blood. This causes a build-up of calcium-phosphate deposits in the blood vessels, which can over an extended period lead to arteriosclerotic heart disease and premature death. The existing medications, such as calcium and aluminium salts, cause serious side-effects. But hope is in sight for sufferers of chronic renal disease. Scientists from the Fraunhofer Institute for Cell Therapy and Immunology IZI in Rostock teamed up with FIM Biotech GmbH to develop an effective therapeutic agent that patients can tolerate well. Formed by marine deposits of volcanic ash 60 billion years ago, clay minerals found in the Friedland area of north-east Germany provide the basis for the new agent. The clay first has to be processed before being refined using a special technical process. In a series of laboratory trials and cell culture experiments, the cooperation partners were able to prove the high phosphate-binding capacity and tolerance rate of the clay minerals. "The phosphate binder obtained from pure mineralogical raw materials is just as effective as traditional pharmaceutical binders. It can lower renal patients' elevated phosphate levels. Our tests using animal models show that, unlike standard medications, our binder causes only mild side-effects," says Prof. Dr. Steffen Mitzner, head of the Working Group on Extracorporeal Immunomodulation in Rostock and Professor of Nephrology at the city's university. The scientists believe that their refined natural raw material could also be used in the treatment of inflammatory bowel disease.

Ultra-thin tool heating for injection molding

In future, thin-film heating will allow plastic parts to be produced with greatly improved surface quality. To manufacture plastic parts with high-end surfaces, the entire forming tool is heated to around 110 degrees Celsius using a technique known as "Variothermic Tempering." Thermoplastic materials such as polycarbonate are processed at similar temperatures. In order to get the finished plastic part out without damaging it, the mold must be cooled by around 20 to 30 degrees Celsius. This has to be done for every production cycle before the whole process can begin again, which "eats up a considerable amount of energy," explains Mr. Alexander Fromm from the Fraunhofer Institute for Mechanics of Materials IWM in Freiburg. Working to improve the situation, Fromm and his colleagues teamed up with the Kunststoff-Zentrum in Leipzig to develop a new kind of tempering technique that, depending on the product, is up to 90 percent more energy efficient than other techniques used to date. The trick is to avoid having to heat up the entire tool; these can weigh half a ton or even more depending on the plastic part being produced. All that is heated now is the surface of the tool that actually comes into contact with the plastic melt. Researchers coat the wall of the forming tool using a vacuum-based coating technique known as sputtering. Hitting them with energy-rich ions sends them ricocheting around the vacuum chamber. The sputtered material is deposited onto the surface of the

4. More cost-efficient plastic components with improved surface quality: This injection-molding tool is equipped with thin-film tempering coatings (round area on each half of the opened tool). © Fraunhofer IWM

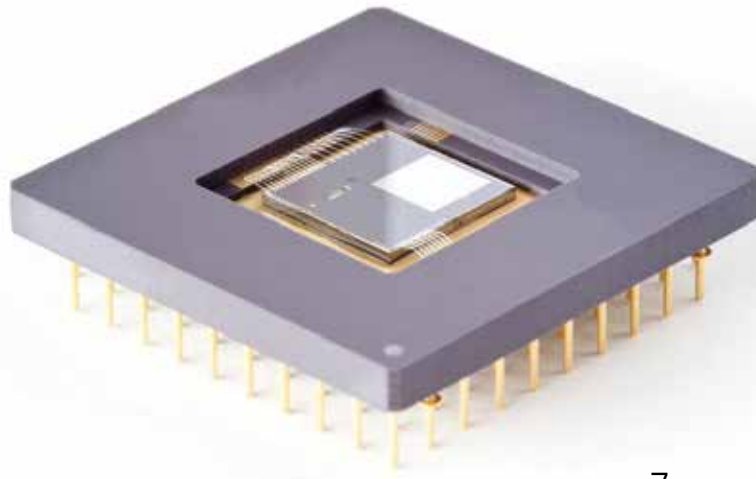
5. This wood foamed board is an entirely natural product made from sustainable raw materials. © Fraunhofer WKI

6. View into the analysis sieve: The sensor system "PuriCheck" can be connected to all standard cleaning systems. © Fraunhofer IPA

7. Programmable ultra-fast Micro Mirror Array for optical microscopes © Fraunhofer IPMS



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MEMS mirrors for genetic research

Researchers at the Fraunhofer Institute for Photonic Microsystems IPMS in Dresden have developed a programmable microelectromechanical (MEMS) chip which can divert light of varying wavelengths at ultra-high speed and with micrometer-accuracy. Installed in an optical microscope, this technology can be used to illuminate multiple targeted areas, which can be smaller than single cells and thereby stimulate specific light sensitive molecules as ensemble. In addition, it is possible, by using a second chip, not only to select specific areas precisely but also the angle at which these are illuminated. This technique is able to reach objects that appear as structures to be highlighted with even greater precision and to significantly reduce the many undesired environmental influences. This research collaboration between Fraunhofer and the Institut Pasteur is being supported by the German Federal Ministry for Education and Research and the French National Research Agency within the framework of the Inter Carnot Fraunhofer Programme.

forming tool in layers only a few micrometers thick (1 micrometer equals one thousandth of a millimeter). Not only can this extremely thin coating be used to heat the forming tool surface to the desired temperature, but it is also capable of withstanding the thermodynamic stresses that occur during injection molding.

Effective thermal insulation with wood foam

Traditionally, the construction industry uses hardboards or expandable foams based on petrochemical plastics as they are good insulators that are affordable and easy to produce. But these materials are not particularly kind to the environment. Researchers at the Fraunhofer Institute for Wood Research WKI in Braunschweig have adopted a very promising approach by developing a method for creating foam from wood particles. "Our wood foam can be used in exactly the same way as conventional plastic spray foams, but is an entirely natural product made from sustainable raw materials," explains Professor Volker Thole of WKI. The scientists produce the foam by grinding wood very finely until the tiny wood particles become a slimy mass. They add gas to this suspension to expand it into a frothy foam which is then hardened. The hardening process is aided by natural substances contained in the wood itself. Wood foam is a lightweight base material that can then be made into rigid foam boards and flexible foam mats. "We analyzed our foam products in accordance with the applicable standards for insulation materials. Results were very promising; our products scored highly in terms of their thermo-insulating and mechanical properties as well as their moisture-related, characteristics," Professor Thole reveals. The Braunschweig-based scientists are working out suitable processes for mass-producing wood foams on an industrial scale.

Keeping an eye on component cleanliness

There are exceedingly strict cleanliness guidelines for components in sectors such as the automobile industry. And yet monitoring of the process for parts purification has been inadequate to date. Researchers at the Fraunhofer Institute for Manufacturing Engineering and Automation IPA have developed a sensor-based measurement system that is integrated directly in the cleaning system, where it registers and analyzes particles caught up in the cleansing fluid. "PuriCheck" - a system that will make future cleanliness controls simpler and much more efficient. The system consists of an analysis sieve with a variable mesh width, along with integrated camera technology and software for image analysis. The analysis sieve is installed in the system, directly in the flow of the rinsing bath, trapping any particles larger than the chosen mesh width. The built-in camera records the surface of the sieve at freely chosen measurement intervals and passes the images along to the software. The software, in turn, analyzes the size and quantity of particles and generates the results in tabular form. Alongside monitoring of purification processes, "PuriCheck" is also an asset to cleanliness analysis of components: because the individual work steps no longer need to be carried out by hand and are now automatic instead, the sample size can be increased considerably.

Critics sold my product, says MP3 co-founder

Brandenburg: How Technology Beat Criticism To Rule The Market



On being at the right place at the right time
64
I was at the right place at the right time. I was at the right place at the right time. I was at the right place at the right time.

It's no secret that the music industry profited from MP3 technology, but it's clear for the MP3 player.
They turned on the music and in fact, before the music started to play, I remember seeing the MP3 player on the shelves of the store. I remember seeing the MP3 player on the shelves of the store. I remember seeing the MP3 player on the shelves of the store.



After his Diploma in Electrical Engineering (1980) and in Mathematics (1982), Dr Brandenburg obtained his Ph.D from the Friedrich-Alexander University Erlangen-Nuremberg in Electrical Engineering for his work on digital audio coding and perceptual measurement techniques in 1988. The research results of his dissertation are the basis of MPEG 1 Layer 3 (mp3), MPEG-2 Advanced Audio Coding (AAC) and most other modern audio compression schemes.

CITY EXPRESS
The City Express Express, Bangalore, Karnataka, on February 24, 2014

MP3 and the dream of high fidelity

Brandenburg: For me, the MP3 player is a dream. The dream of high fidelity. The dream of high fidelity. The dream of high fidelity.

Brandenburg's lecture titled 'High fidelity and the dream of high fidelity' was held at the Fraunhofer Institute for Digital Media Technology IDMT, Erlangen, Germany, on February 24, 2014.



Prof. Dr. Karlheinz Brandenburg, one of the founding fathers of the MP3 player, gives a rundown of the history and future perspectives of the MP3.

The MP3 Wizard!

The co-founder of MP3 and the Director of Fraunhofer Institute for Digital Media Technology IDMT, Prof. Dr. Karlheinz Brandenburg was in India in February this year. He visited several industry giants and delivered tech talks at Google, Microsoft etc. on topics such as future trends in Digital Media. He shared his wealth of knowledge on MP3 through his Science Circle lecture jointly organized by the German Embassy, DWIH, DAAD, Fraunhofer and the Goethe-Institute in Bangalore. Recently, the German Business Journal Manager Magazine inducted him into the "German Research Hall of Fame" for his outstanding contributions to the development of Germany as a research location. Excerpts from his interview:

MP3 reinvented the audio space, brought a new buzz with a new standard of digital music compression that allowed devices to store lot more music than the traditional tapes and CD's. What next for MP3 and music storage devices?

MP3 will remain as the one system which is universally available. MP3 playback is available on all the devices. Currently and for the future, there are different developments taking place: Newer MPEG audio coding standards like AAC (Advanced Audio Coding), HeAAC (High-Efficiency Advanced Audio Coding), USAC (Universal Speech and Audio Coding) deliver either better audio quality at the same bit-rates (ex. AAC used by Apple) or good quality by lower and much lower bit-rates. The latter is necessary for applications where the capacity is still limited like streaming of audio via mobile connections. For music storage, I see a development towards higher bit-rates to get the ultimate audio quality. We could reach very high audio quality today but it lies in the decision of service providers (e.g. streaming services) to select audio codecs and bit-rates which can deliver such quality.

Video storage especially on compression has not moved forward. With the advent of smart mobile phones, the demand for video content has been huge. The bandwidth is a challenge, apart from speed of delivery 4G, maybe 5G soon and so on, do you see in the near future a standard emerging for video compression to deliver high quality

in a small file thereby easing the pressure of speed and bandwidth.

While video coding is not my area of expertise, I still follow the developments. In video compression, over the last decades, there has been a lot of progress, certainly equal if not larger than the progress in audio compression. Still, the raw bit-rates (for video) are much larger compared to the bit-rates of uncompressed audio. Therefore the bandwidth resources to transmit or store video are still much larger compared to audio. Regarding standards: There are standards, but not all companies want to adhere to these standards. This is why we still see different systems.

Have you visited India before, what excites you about India?

Once, my wife and I came to India for a vacation and toured through Rajasthan. I had also given talks at conferences before and this is my fifth visit. India for me is on one hand, the old culture which brought the numbers and lot of mathematical understanding to the world and on the other hand, a developing country with cutting edge technology, but still thriving to bring development for everyone.

“BHEL LAID STRONG EMPHASIS ON R&D”

Interview with Mr. O.P.Bhutani, Principal Adviser (E, R&D), Bharat Heavy Electricals Ltd. (BHEL).

What is your vision for R&D at BHEL?

Innovation is at the core of BHEL's activities and we have adopted it in our vision statement for R&D viz., “an innovative developer of clean, efficient, reliable and affordable products, systems and technologies.” Our vision essentially is driven by achieving self-reliance for the country, in areas of critical technologies identified at national level, based on our engineering & technical expertise as well as leveraging expertise available with Academia & R&D Institutions.

How is BHEL fast tracking its R&D efforts?

BHEL has laid strong emphasis on R&D since its first corporate plan was implemented in 1975. The R&D management system of BHEL was first formulated in the mid 70's and since then has been continuously revisiting/ reviewing its R&D processes and system, for the changes required due to changing business environment, Government policies, customer profiles, and technological & scientific developments taking place at a fast rate. BHEL has enhanced its focus on development of indigenous technology as well products by accelerating its R&D activities through recognizing the need and taking initiatives in several areas like redefining roles of its R&D centres, strengthening product related R&D groups, institutionalizing mechanism to plan and monitor R&D projects in project mode coupled with addressing and tracking issues including manufacturing in the entire chain of development process, collaborative research & applied R&D involving multiple approaches along with academic institutions and R&D organizations as a part of its Strategic R&D Plan.

While formulating strategic R&D plan, BHEL also kept the long term R&D focus in mind, and synergized “National Perspectives” and identified technological goals in the 12th Plan document for working towards self-reliance and indigenous technology development. 14 long term “Key Drivers” have been identified that will guide the developments in next 10-20 years. Having identified “Key Drivers,” based on inputs from all stake holders, 146 “R&D Programmes” have been identified, and firmed up. Out of these, 15 numbers have been picked up as “Mission Projects.” More than 1500 projects have been identified across the company and many of these projects may require expertise of R&D organizations for which long term MOUs have been envisaged. Apart from Power Sector, the company has several new projects lined up in the area of Renewable Energy, Power Electronics, Transmission, Transportation, Water etc.

Could you please share your experience of working with Fraunhofer and how do you view its role in India?

BHEL's experience of working with Fraunhofer has been extremely good especially, in terms of understanding our specific requirements of collaborative R&D activities, quick response and



addressing time line for the deliverables etc. We see Fraunhofer, as an important R&D institute engaged in applied R&D, prototyping and establishing manufacturing technologies, etc. We also understand that it established links with academia which can also serve as useful window between academia and industry. BHEL has been utilizing Fraunhofer's expertise in establishing manufacturing process in highly technologically intensive areas which will help to indigenize the manufacturing processes. The others areas of cooperation include the Renewable Energy, Transportation segments for which BHEL has been in touch with Fraunhofer, through its office at Bangalore, India. The key observation in R&D ecosystem refers to the fact that academia is good at research work and industry is very keen to commercialize the developments but the distance to be travelled for their integration is very long and demands focus as well as expertise in managing the R&D. This is the role where Fraunhofer fits in. We also feel that the Fraunhofer's vast R&D experience can be utilized in development of an overarching roadmap for the future strategy planning of the R&D activities covering different business areas including Renewables, in order to plan the coordinated development and deployment of new and existing technologies and applications. It may involve the identification, analysis, assessment and projection of both technologies and applications necessary to meet market needs under different future circumstances.

Could you please outline BHEL's growth strategy for the next five years?

Power sector will continue to remain major contributor in our top line with transportation and transmission emerging as next big business verticals. Strategies are in place to strengthen our presence in Nuclear, Renewable and Water segments. Company has adopted its Strategic Plan 2012-17. The plan attempts to steer the company towards becoming a global engineering enterprise. Key drivers of our success are - expanding our offerings in power sector by building EPC capability, focus on industry businesses, expansion of spares & services and adoption of collaborative approach in technology development. The company has been also continuously sharpening its focus on '6-Point' priority areas for action viz. Capability Enhancement, Accelerated Project Execution, Product Cost Competitiveness & Quality, Diversification, Engineering & Technology and People Development aligned with its Strategic Plan initiatives to sustain its leadership position in its areas of operations.

'Engineering and Technology' is our strength. To uphold our reputation for excellence in our core capability, we will continue to upgrade existing products to contemporary levels and develop new products through continuous in-house efforts as well as through acquisition of new technologies, as appropriate. Efforts are being made to make supply chain agile and accelerate project execution, sustained focus on Vendor Base Expansion, Scaling up procurement through technology initiatives, Advanced Manufacturing Action, Global Sourcing etc. Considering the National Action Plan on Climate Change targeting 15% of electricity generation from Renewables by 2020, BHEL is focusing towards expanding its capacity to manufacture photo voltaic modules & cells.

"BHEL's R&D activities have grown manifold and several notable successes have also been achieved. The company's current R&D expenditure, at around 2.5% of turnover, is among the highest in the country. In the engineering & industrial segment, BHEL is the leader in IPR filing in India. In fact, CSIR, with more than 35 labs under its belt, is the only institution in India which files more patents than BHEL. Further, technology availability scenario has entirely changed and the technology leaders / providers not only showed reluctance to share technology but also emerged as competitors. This change in business environment called for renewed focus on in-house R&D leading to revisiting the R&D policy of the company once again in 2011."

Mr. O.P. Bhutani, Principal Adviser (E, R&D), BHEL

FORTHCOMING ACTIVITIES AND EVENTS

- The Cluster FLEET (Flexible Electronics Encapsulation Technologies) - a Fraunhofer initiative - combines competences of four institutions and one company, all located in Dresden, and will present its expertise at the 10th ICCG (The International Conference on Coatings on Glass and Plastics) from June 22-26, 2014, Dresden. For information on sponsorship, preliminary program as well as registration, visit - <http://www.iccg10.de/>
- Titled "Increased Flexibility in Car Body Construction," the 7th Chemnitz Car Body Colloquium CBC 2014 on October 8-9, 2014 focuses on challenges in the automobile production along the entire process chain – covering topics such as materials, tools and mold making, press plant and component production, as well as construction methods and industry 4.0. For more information, visit - http://www.iwu.fraunhofer.de/en/events-and-fairs/CBC_2014.html

FUSECO Forum Asia 2014 - Telecommunication Conference: June 9-10, 2014, Bali Ayodya Hotel, Nusa Dua, Bali, Indonesia

We are proud to invite you to the upcoming first FUSECO Forum Asia (FFA) themed "Future Telco Ecosystem within Smart City and Beyond – Understanding the Change of Telco Business" in Bali, Indonesia. FFA is based on the successful Fraunhofer FOKUS FUSECO Forum series held in the last decade and will discuss for the first time ever the addressed topics and technologies in the booming region Asia. You can gain insights and learn from the experiences of distinguished experts within telecommunication industry coming from more than 15 countries from Europe, Asian and South America. FFA will be co-organized by PT Telkom Indonesia, the biggest operator of Indonesia. For registration details and other information, please visit - www.fuseco-forum.asia

Study Mission - R&D Ecosystem in Germany, June 23-27, 2014

Confederation of Indian Industry (CII) in partnership with Fraunhofer-Gesellschaft has come up with a unique opportunity for you to strengthen your research and development, technology and innovation capability. In the last 3 years, Indian companies partnered for 3.0 million euros worth of research projects to various Fraunhofer institutes. Today, Fraunhofer works with 30 of the 50 leading companies in India such as TATA, BHEL, TCS, L&T, TAFE to name a few with projects in various sectors such as Technology, Textiles and New Materials, Automotive, Aviation, Aerospace and ICT. CII will be leading a delegation on a Study Mission to Germany in association with Fraunhofer during 23rd to 27th June 2014. The purpose of this mission is to provide an insight into Germany's R&D ecosystem. To participate in this mission or for any further details and enquiries, please contact Mr Avinash Lohia, Counselor, CII on email ID: avinash.lohia@cii.in

3rd Fraunhofer Innovation and Technology (FIT) platform: November 18-19, 2014, The Taj West End, Bangalore, India

Fraunhofer is Europe's largest applied research organization with 67 Institutes, more than 23000 employees and an annual turnover of Euros 2 Billion. The Fraunhofer Innovation and Technology (FIT) Platform is an exciting initiative and annual flagship event of Fraunhofer which focuses on different thematic fields and showcases cutting edge technologies, innovation and solutions like never before. The 1st and 2nd FIT Platform held in 2012 focused on "Mobility & Logistics" and "Sustainable Technologies for the City of the Future" as thematic areas respectively. The 3rd FIT Platform 2014 will focus on "Energy Efficiency and Renewable Energy" as thematic area for this edition. The event will kick off on 18th November 2014 with a high profile panel discussion on the subject "Powering to a Greener Future" and will be followed by a networking dinner. The second day, 19th November will be devoted to technical sessions on the sub-thematic areas of Energy Efficiency, Wind Energy and Solar Energy. The event is expected to be attended by more than 200 Delegates from India and abroad, mostly by CEOs, CTOs, and Innovation experts from Industry and Research as well as Government.

PROFILE: FRAUNHOFER

Fraunhofer-Gesellschaft

Fraunhofer has been active in India since the past several years, bringing innovative technologies and research competence to India. Fraunhofer offers applied R&D services in various fields such as technology, textiles and new materials, aviation, aerospace and ICT. Ms. Anandi Iyer heads the Fraunhofer office in India. Based on her network within Fraunhofer, she makes innovative technologies accessible to our Indian clients which include several top Indian companies and establishes strategic partnerships with Indian research and trade organizations. The Fraunhofer-Gesellschaft is a recognized non-profit organization that takes its name from Joseph von Fraunhofer (1787-1826), the illustrious Munich researcher, inventor and entrepreneur.

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Editorial notes

Editorial Team

Ms. Anandi Iyer
Ms. Prathyusha Josyula

Cover Page Credit:

Devoted to industry's current megatrend Industry 4.0, the lead theme and motto of the world's biggest industrial trade fair, the Hannover Messe 2014, Germany was "Integrated Industry - NEXT STEPS." Picking on this trend, the Fraunhofer Institute for Industrial Engineering IAO showcased its Morgenstadt: City Insights, Micro Smart Grid, and ChargeLounge projects. Visitors could bring the 3D model of a city to life using a smartphone app and learn all about Morgenstadt projects such as autonomous driving, urban gardening, urban production, and energy generating facades at the overall city level.

Fraunhofer Advisory Council in India

The Fraunhofer Advisory Council in India consists of Indian and German industry leaders, who are practitioners in innovation and research. This pool of experts meets at least two times a year and guide, mentor and catalyze Fraunhofer activities in India.

The members are:

- Dr. Homi Bhedwar,
Director, Dupont Knowledge Centre, India
- Mr. O.P. Bhutani,
Principal Adviser (E, R&D), BHEL
- Mr. Jayant Davar,
Co-Chairman & Managing Director, Sandhar Technologies Ltd.
- Dr. Gautam Chatterjee,
Jt. Executive President, Aditya Birla Science and Technology Company Ltd.
- Mr. Subu Goparaju,
Ex-SVP and Head, Infosys Labs and Products R&D
- Dr. Leena Srivastava
Vice Chancellor, TERI University and Executive Director, TERI
- Dr. V. Sumantran,
Chairman, Celeris Technologies
- Shri. Shyam Chetty,
Director, National Aerospace Laboratories (NAL)
- Dr. Ajay Mathur,
Director General, Bureau of Energy Efficiency (BEE)

