

GLOBAL PACKAGING RESEARCH

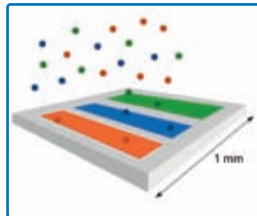
The international packaging research and education newsletter

Intelligent food packs in demand

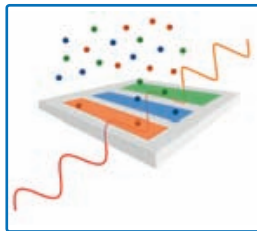
The momentum behind intelligent packaging for food is growing, says Belgian non-profit organisation Pack4Food, as highlighted by the CheckPack collaborative project co-ordinated from the same department at Ghent University.

At the Food Microbiology and Food Preservation laboratory, project co-ordinator Mike Vanderroost refers to a wider survey he recently carried out. "Researching my paper on intelligent packaging for food, I discovered that there's increasing demand from industry for ways to monitor food packaging," he says. "There are more European research projects than ever focusing on intelligent solutions."

The CheckPack university consortium is working on a covert, non-destructive tech-



CheckPack: 1. Coatings on the sensor capture odour components



2. IR light gives information on odour concentrations

nology for assessing the onset of product spoilage via a combination of a gas-detecting optical sensor and an infra-red (IR) reading device. The presence of certain gases, including those produced during the spoilage process, changes the surface 'signature' of the sensor, picked up by the IR device.

The same technology can be used to detect changes to the gas mix inside modified atmosphere packaging (MAP). Ultimately, the goal is to integrate the sensor into the lidding film.

Funded by the Flemish government, the four-year project involves the three Belgian universities of Ghent, KU Leuven and the Vrije Universiteit in Brussels, plus Radboud Universiteit Nijmegen, the Netherlands. Pack4Food is a member of the project's advisory board. www.checkpack.ugent.be

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Valencia 2015: a Call for Papers

Host organisation for the 2015 IAPRI Symposium ITENE, Spain, has issued a Call for Papers, and has said it expects to receive more than 100 submissions for the event.

The Symposium will be held in Valencia from 8 to 11 June 2015 at the Bancaja Cultural Centre, a conference venue in the city centre.

Those wishing to submit papers for the event should provide abstracts for the

peer-review stream by 30 November 2014, and for the general stream by 31 December.

ITENE's Ana Garcia Hidalgo says: "We invite researchers from all over the world to join us in presenting their findings on packaging, distribution and logistics, building together a programme of the highest scientific level possible."

www.itene.com/iapri2015

Comment

30 years with IAPRI

June next year will bring an end to my term as vice-president and Board member of IAPRI. The last 10 years on the Board, and especially the last three as vice-president, have been an enriching experience for me. I'm also pleased at the changes within IAPRI that I've witnessed over the past 30 years.

My first interaction with an IAPRI World Conference was the 1984 event hosted by Michigan State University. This marked the first time such a conference was held outside Europe. IAPRI was founded in 1971, and within the first few years had established itself as the world's leading packaging research association. Over time, the organisation expanded to embrace the packaging world beyond Europe. Conferences and symposia occurred with greater consistency, and the number of participating members grew substantially.

Today's IAPRI includes members from all over the globe, and with this growth we have seen both the number and quality of research papers increase. The addition of the peer-reviewed paper stream has met an important need for many researchers in universities and institutes who require dissemination of their scholarly efforts.

As the global community addresses the challenge of providing safe and nutritious food for the world's population, research in food packaging is one of several notable growth areas.

Exciting times lie ahead for IAPRI and its member institutes. I will try to stay connected to my IAPRI colleagues and this important work.

Thank you for the privilege of serving on the Board.

Dan Goodwin
Rochester Institute of Technology

EU packaging waste amendments rapped

Proposed amendments to the EU's Packaging and Packaging Waste Directive (PPWD) are coming under intense scrutiny given the higher recovery targets, measurement and definition changes, and the potentially higher costs.

At UK research organisation Incpen, director Jane Bickerstaffe sums up the challenges: "The main point about the Commission's proposal is that most of it is impossible to achieve, for instance the level of targets; some of it is unclear (what is 'preparation for reuse' when it comes to packaging?); it takes no account of practicalities, such as the varying costs of recycling depending on geography; it appears to recommend that Member States should make industry pay for things over which it has no control (such as litter); and it has presented no evidence that the environment will benefit."

A July memo from the UK's Department for Environment, Food and Rural Affairs (DEFRA) highlighted many anomalies.

It singled out, for instance, an article allowing the introduction of national packaging requirements, and commented that this might not only run counter to the spirit of harmonisation but also threaten the single market.

Incpen has said it wants to ensure that policy continues to allow innovation in packaging. Bickerstaffe says: "The waste hierarchy was designed as an order of preference for how to handle waste. The Commission now appears to regard it as a design guide. This is not appropriate for packaging which is designed to enable the product supply chain to operate as resource-efficiently as possible."

She is also critical of certain aspects of the 'circular economy': "It appears to be focused on material conservation at end of life, instead of resource-efficiency throughout the supply chain – which can be achieved both by laminate structures and by recyclable single materials, for example."

www.incpen.org

News in Brief

The EcoPaperLoop project, supported by the EU's European Regional Development Fund, is holding its final conference on 2 December 2014 at the Galaxy Hotel, Krakow, Poland. Focus areas have included techniques for assessing the recyclability of paper-based packaging. COBRO, the Polish packaging research centre, is among the project partners.
www.ecopaperloop.eu

The annual European Bioplastics Conference will take place on 2 and 3 December 2014 at The Square in Brussels, Belgium. Representatives of Michigan State University (USA), COBRO (Poland), and Europen will be among the speakers.
www.european-bioplastics.org

Individual researchers at member institutes are invited to include their details on the IAPRI Researcher Directory, hosted by the IAPRI website and available to non-member organisations. Currently, some 60 individual researchers are listed, says secretary general Marie Rushton. Please contact her for details:
marierushtoniapri@gmail.com

The Digital Print for Brand Success conference will be held on 6 November 2014 at Kings Place, London. Speakers at the event, which is organised by Whitmar Publications, will include Mondelez International.
www.paperandprint.com/digital-labels-and-packaging/digital-print-for-brand-success.aspx

Contribute to international research on consumer perceptions of packaging

IAPRI member the Association of Packaging Technology and Research (PTR), Finland, is working with other participants in IAPRI's Packaging and the Consumer Working Group (WG) to co-ordinate international research on student attitudes to packaging, and is encouraging the involvement of additional member organisations later this month.

At the last WG meeting at the June IAPRI Conference in Melbourne, delegates from up to 12 countries expressed interest in the proposal. The idea is that 100 male and 100 female students from each participating country should complete questionnaires.

The prepared questionnaire, which is available from PTR (see links below), explores the following areas: functional value (such as openability), on-pack information, environmental considerations (including perceptions of different materials), 'symbolic' value (for example, the relationship between packaging and brands), aesthetic appreciation and the relationship with product price.

PTR director Virpi Korhonen will need to hear from any new potential participants as soon as possible (by October 6) so that the survey can be run between October 20 and November 3. Results will be collated by



“There was growing interest in collecting international survey data on future consumers; in other words, the millennial generation”

PTR during November and submitted by all research partners as a general-track paper at the IAPRI Valencia Symposium next June.

Korhonen explains the background to her proposal: “PTR has just finished a three-year project studying the value perceptions and packaging preferences of LOHAS (lifestyles of health and sustainability) consumers. As we proceeded with the project, there was growing interest in collecting international survey data on future consumers; in other words, the millennial generation.”

International packaging manufacturers are interested in the similarities and differences between consumers in various countries. “Similar interests were expressed by the WG members, since cross-cultural data is rare and quite expensive to collect,” she adds.

“Nothing ventured, nothing gained,” Korhonen philosophises. “By preparing this as an online survey, we wanted to make the threshold to participation as low as possible for WG members. The applied scales have been validated in our previous research.”

She adds: “The Packaging and the Consumer WG provides us with a great platform for members with a similar interest in conducting this study and identifying the major sources of value in packaging for the future.”

The questionnaire can be viewed here: http://fi.surveymonkey.com/s/package_value_survey
More information from: virpi.korhonen@ptr.fi

Feasibility study for corrugated standards

Innventia, Sweden, has launched a feasibility study looking at uniform function standards for optimised corrugated board, with the aim of ultimately establishing Europe-wide or international standards.

“The project is a feasibility study in order to be able to map out the direction for a focused development effort,” says paper physics researcher Johan Alfthan. “There is currently no global overall standard. However, there is an abundance of standard methods for specific material properties. This means that goods exporters and packaging users are dependent on corrugated board suppli-

ers and their choice of testing methods.”

One key area of uncertainty, for instance, is the effect of humidity. “Standards are quite limited when it comes to high-humidity conditions,” says Alfthan.

The idea is that, although some exporters may underestimate material requirements, resulting in failures and rejects, many more overcompensate. Very often, the volume of packaging material could be reduced without compromising product safety, says Innventia.

The first step, it says, will involve an

evaluation of how different users of packaging experience and deal with problems associated with transport packaging. The next step will review information from existing global standards and test methods. The organisation will then host a workshop to match end-user requirements with corrugated properties.

The project is receiving financial support from the Swedish Angepanneforeningen technical consultancy's Foundation for Research and Development. www.innventia.com

Modified atmosphere: in need of modifications?

Tailoring the gas mix inside a food pack to ensure the longest possible shelflife for the product is nothing new, especially in developed markets. So has the technology advanced as far as it can? Or is there room for new research in this area?

Modified atmosphere packaging (MAP) is today a standard technology for many food producers across a range of product categories and pack formats. Experts say that, despite a recent keenness among gas companies to promote argon, for example, as a rather more expensive alternative to the standard range of MAP building blocks, changes to the basic technology tend to be on the incremental, evolutionary level rather than revolutionary step-change.

Despite this apparent technological plateauing, there remains a continuous flow of research examining ways of optimising MAP systems themselves and improving online quality control to ensure the best possible results in the supply chain. Interestingly, much of this activity originates in those Nordic markets which are among the most mature in terms both of the penetration of MAP and in standards achieved.

In a 2009 report, Smithers Pira forecast global annual growth in the active and modified atmosphere packaging market of 7.5% to reach a value of just under \$3.5 billion by 2014. Quite how accurate that prediction has proved and how much of any growth is attributable to active packaging technologies is unclear. However, it seems likely that the highest growth rates – in terms of food companies coming to MAP for the first time – apply outside the technology's 'heartland' of northern Europe. For many European and North American businesses, the focus is on automating and optimising existing operations.

“If laser systems take two measurements, even minutes apart, they will typically be able to identify a change in the atmosphere”

The Danish Technological Institute (DTI) is working with nine other Nordic and Italian partners on an EU-funded project as part of the Food Processing Program. The Safetypack project began at the beginning of the year. It aims to develop applications for laser spectroscopy in order to accurately measure the gas mix inside a range of clear and semi-clear packaging in different materials (though excluding foil laminates and cans, for instance). One objective, says the consortium, is the demonstration and validation of inline pilot installations for tortilla-style bread and cheese.

The aim in both of these applications is to move from lab-scale operation to offline checking in an industrial setting, and then



The Safetypack laser concept

finally in the third year of the project to a full inline system running at production speeds.

“It’s rare for packs to leak,” says Soren Ostergaard, team manager for packaging and logistics at the DTI. “Any oxygen inside the pack is likely to be trapped in the product itself. If laser systems take two measurements, even minutes apart, they will typically be able to identify a change in the atmosphere. The system will also spot trends. If, say, 10% of your product is trapping excessive air, you may need to change your processes.”

Microflora in the product can also change the gas balance in the pack’s headspace over time.

The DTI’s role will be to validate the laser systems at different stages and to disseminate information, acting as a link with the packaging industry and packaging research.

IAPRI corporate member Mocon acquired Danish MAP quality control (QC) specialist Dansensor two and a half years ago. Sales



Dansensor technology at Tulip, Denmark

and marketing director at Dansensor Karsten Kejlhof explains that the company supplies both freestanding equipment for online and offline applications and QC components for integration into automated filling and packing lines by machine manufacturers.

Kejlhof explains the difference between Dansensor's approach to QC and the Safetypack concept. "So far, we have not met a packaging machine we cannot keep pace with," he says. "Our inline system measures the gas flushing process right before the sealing is done. The laser systems are intended to substitute the manual testing, and should be able to detect the content of sealed packages. This gives a number of advantages, such as the certainty that all packs are correctly flushed and sealed. Our inline system, for instance on thermoformers, only gives an average value of all the packs in the index, and so is more of a quality control than a check on each individual pack."

He adds: "I think there's a significant section of the industry which would still benefit from optimising its MAP lines."

For instance, Danish meat processor KodGrossisten moved from offline Dansensor headspace analysis to an online process. The equipment company calculated that the investment would be justified on the basis of packaging and product savings, thanks to a move to a non-destructive test, and labour savings.

There are other benefits. "We do not need to rely on people to do the testing, and it is a much more accurate system," Anette Frolund, who is responsible for quality assurance at the food company, said in a statement.

Meanwhile, Dansensor and the Campden BRI research centre in the UK have jointly published a white paper on MAP, addressing many of the issues around quality control, including online versus offline testing, regulatory requirements and traceability. It does not provide new research, but offers a 'roadmap' of considerations from a single source, says Dansensor.

One of the prime categories which could still benefit from MAP is fresh produce, Kejlhof argues, particularly in combination with microperforation. In fact, as was evidenced by papers presented at

the IAPRI Conference in Melbourne this June, there is huge interest in tailoring MAP to the needs of different fruits and vegetables and in the precise shelflife-extending processes involved.

A team from the University of Tokyo gave a presentation on the effects of in-pack atmosphere on tomatoes, and a Thai group from MTEC and Kasetsart University examined ways of optimising MAP for longan (a lychee-like fruit).

At Nofima in Norway, senior research scientist Marit Kvalvag Pettersen says: "In my opinion, MAP could be better utilised by tailoring the atmosphere to specific products, especially for fruit and vegetables, where the gas composition and barrier properties are vital for the ripening and shelflife of the product."

But she says the same could also be true of other product categories, notably where MAP is used in conjunction with active packaging options such as oxygen scavengers, CO₂ emitters and ethylene absorbers. "Earlier this year, we published a paper about the shelflife of chicken in different gas atmospheres in combination with a CO₂ emitter," she adds.

"MAP could be better utilised by tailoring the atmosphere to specific products, especially for fruit and vegetables"

To date, though, she says applications of active technologies such as gas emitters and absorbers have been limited. "This is probably due to increased costs, practical aspects and maybe because the concepts haven't been optimal," Pettersen explains. "But I think there will be an increase in the use of this technology as the availability of products grows." The packaging industry is already working on concepts where the active component is integrated directly into the pack or film, she reports.

Nofima researchers have also worked in detail on the effects of perforation, last year publishing a paper on determining oxygen and CO₂ transmission rates for whole packs and single perforations in fruit and vegetable packaging.

Like Dansensor, Pettersen believes there is a difference in the way MAP is typically applied and managed in larger and smaller food businesses. "Larger companies probably have both the knowledge and the opportunity to adjust, for instance, the gas composition optimized to the specific product, utilising more fully the opportunities in MAP. But in smaller businesses, I think they have less flexibility in terms of the gas composition, packaging methods, and so on, and are more likely to apply more or less the same gas and conditions for all types of product."

Just as all modified atmospheres are not as stable as their creators would like them to be, the sector itself is not – it seems – as unchanging as it sometimes appears.

www.dansensor.dk

www.dti.dk

www.nofima.no

RMIT, Melbourne: sustainability with a technical edge

Australia's RMIT University in Melbourne was originally the Royal Melbourne Institute of Technology. Today, technology and design remain central to much of its activity. The Sustainable Products and Packaging group within RMIT's Centre for Design and Society has, since the 1990s, established a strong reputation in the science around packaging sustainability, ecodesign and lifecycle analysis (LCA).

Although the group sits within the School of Architecture and Design at RMIT, it has been developing 'cross-border' links with other departments such as Industrial Design and in disciplines as diverse as media & communications, computer science/IT and value chains. "This creates a more comprehensive approach to working with our research partners, and provides them with a broader perspective," says associate professor Karli Verghese.

"As one of the leading academic research groups working in Australia, we've conducted studies for industry and all three levels of government, in areas as diverse as packaging materials – including bioplastics – recycling and waste management," she says.

As a recent example of the team's work with industry, Verghese points to the 'Future of Packaging' white paper developed in 2012 for the Australian Food and Grocery Council (AFGC), the leading organisation for this sector in Australia. "The paper, which forms a component of the AFGC Sustainability Commitment, maps out 18 key recommendations for packaging sustainability over the coming years," she says.

Meanwhile, when it comes to LCAs, this is a discipline which has undergone rapid development. "In recent years, the science of LCA in the packaging supply chain has focused upon the development

"There is a slow change where people are seeing the value that packaging provides, and its role in reducing waste"

of online packaging-specific decision support tools," Verghese says. "These tools provide a streamlined approach to undertaking packaging material LCAs." As such, they can help organisations in decisions regarding pack design, material selection/specification and supply chain optimisation.

This type of tool allows LCA principles to be introduced to non-technical people, Verghese explains, filtering down from sustainability and packaging technology specialists to marketing departments, for instance.



The 'Green Brain' building, RMIT: an image for the group's work?

With over 30 of the companies in Melbourne's Plenty Food Group, the team worked on the theme of resource efficiency. The final product was an online portal: Dynamic Industry Resource Efficiency Calculation Tool (DIRECT). This allows an organisation to calculate its 'true cost of waste', including food waste, she says.

In 2012, Verghese's team published its first book 'Packaging for Sustainability'. "This provides a comprehensive overview of how an organisation can approach the issue, covering topics such as developing a strategy, designing for sustainability, marketing, LCA, packaging materials, selecting and applying tools, and implementing the strategy," she states.

As well as a focus on resource efficiency throughout the supply chain, including packaging which protects the product, Verghese emphasises the need for easy opening, reclosability and the ability to dispense the product fully with no waste.

The RMIT group has recently focused more on the role of packaging in minimising food waste. "While packaging has traditionally been seen as an environmental evil among many in the community, there is a slow change where people are seeing the value that packaging provides, and its role in reducing waste," she says. "But more education is needed among industry and in the broader society." That 'education' includes using the right materials for the right applications as efficiently as possible, she adds.

Last summer, the team published a study commissioned by CHEP Australia titled 'The role of packaging in minimising food waste in the supply chain of the future'.

At the time, Verghese identified opportunities for improvement, including design innovation to improve ventilation and temperature control for fresh produce and a better understanding of the dynamics between different levels of packaging.

www.rmit.edu.au

www.iapri.org International Association of Packaging Research Institutes

IAPRI was established in 1971 as an international membership association to promote packaging research. It is a unique global network which allows organisations to communicate and develop ideas, exchange experiences and in many cases reduce duplication of effort.

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To contribute to the next issue of 'global packaging research', please contact Editor Paul Gander e: paul@gander123.plus.com

Published by Whitmar Publications on behalf of IAPRI