



**Active and intelligent fibre-based packaging
Innovation and market introduction**

MEETING NOTES

COST Action FP1405 Meeting
Meeting n°4

From:

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Date: 08 - 09th of November 2017

Venue: Tzuba, Israel

Wednesday 8th of November 2017

Ana Dopico:

Consumer research is important, because some AIP are not yet in the market and have a high technology content and the consumer perception of packaging functions are multidimensional.

Millennials give near future, gen X give data of situation now.

Preliminary results: Millennials are more interested in features that concern safety, not sensorial experiences (such as emitting sound and light). Less with properties of convenience, more with safety.

Willingness to pay: about 30% is not willing to pay extra at all because I will throw it away anyway as it is packaging, whereas about 50% is willing to pay max 10% extra.

Send survey to participants, to spread questionnaire across COST members.

Jan Parobek:

Not only a gap between science and industry. There is also a gap between industry and consumers.

If people don't know about it, they will not use it.

The whole supply chain should be involved, not only industry, also consumer.

Supermarkets are often biggest problem, and acts between industry and consumer. Often they don't want A&I packaging in the supermarkets.

Shira Rosen:

Great examples how to involve consumers, connect offline with digital, share on social media, capture moments, to create big buzz.

Ron Nabarro:

Young people market will shrink, baby boomers will be the biggest group. Baby boomers spend 48% of their monthly budget on unnecessities.

Ageing people have less sight, hearing etc, but if you use that wrong in packaging (e.g. insulting) they will not buy it.

"wrap rage": fighting with a package to open, for example with knives and scissors.

Inclusive design versus non excluding design

- Inclusive design: provides tools to bypass impairments (e.g. stick to walk, glasses, assistive things on toilet for handicaps); escalates ageism and discrimination, stigmatizes and prevents self-efficacy, prevents independence and self-esteem. E.g. "I am too old for that" because it is common for younger people.
- Non excluding design: allows barrier free living, avoids all the other things from inclusive, and it stimulates independence and self-esteem.

It's not about how old they are, it's about how they are old.

BUT ALSO: it's how old we make them feel.

How old is old? Division by chronological age, or division by competence or by health age, mental age or lifestyle age.

Eduardo Aires:

Overview of his work.

Liron Tzanhany:

Approach food from different perspective, so for example how can people consume passion, or courage, and then design food accordingly.

Chefs, designers, food industry, etc all in one sort of big design workshop.

Discuss essence of the bite, and essence of the term, and combine those.

Each person from different disciplines came with their own view, and worked together.

Thursday 9th of November 2017

1. STSM presentations

Adriane Cherpinski: Nanopaper with electrospinning PHBV (CSIC-VTT)

PHBV have been electrospun in each side of a CNF nanopaper.

Idalina Goncalves: Chitosan-genipin coating (Univ Aveiro-Grenoble INP Pagora)

Coating of chitosan and genipin and cellulose nanocrystals onto paper.

Issue about color and viscosity were presented.

About 6 μm were deposited.

No anti-oxidant activity were observed and higher amount of syst.

Tanja Radusin (Univ Novi Sad Institute of Food tech - Serbia to Spain CSIC IATA)

Extract from garlic, calendula and helichrysum were mixed with PLA or PHB

Use Bioinicia lab machine , Film press, SEM, TGA, FTIR, DSC, WVTR, etc..

Results work better with PHB for all extracts and only with one extract on PHBV.

Antimicrobial activities are promising and on-going.

JM Ramoz Diaz: NFC/Xylan hydrogels-aerogel (Oulu from Mines Paris tech)

Use tannic acid, xylan from birch and MFC biofibrils from UPM.

Hydrogel is prepared and then freeze dried.

Structure getting stronger with TA. The total content of polysaccharide is the key.

POSTER Session – Pitch presentation

A. Miletic : PLA+ tea tree oil-electrospun

C. Vilela : Chitosan and ellagic acid (see paper: Vilela et al, Food hydrocolloids 73, 120-128, 2017), antimicrobial Pullulan + Lysozyme nanofiber (see paper, Silva et al, Food hyd, 2017, submitted)

D. Todorova: Extract from five herbs from Romania and sprayed on paper

E. Poverenov: Research group presentation (contact active bio nanoparticles, stimuli responsive of nanoparticles, edible active pack)

F. Silva: From lab research to success case producing antimicrobial

M. Pal: Fold and cracks in packaging

P. Simon: Toxicity of nanoparticles

S. Tavman: Electropray have better results than coating

C. Vasile: Active PLA based food packaging (chitosan/vitamin E) and emulsion for PLA coating

11:00-13:30 Working groups discussions – WG1/WG3

First, **WG1** has been discussed; the deliverables and milestones have been presented.

D1.1 Up to date report of research

- Conference & seminars: Aveiro cost, Munich cost, PTS Innov Pack symp,
- Industry leaflet: (priority 1) active packaging, intelligent & interactive pack, current legislation
- Review papers: discuss in Bled, Review about active pack for food (have been accepted),
- Functional inks for intelligent food packaging
- Book chapters are on-going: 4 projects

D1.2 Guidelines/roadmap for future research and development

- meeting at Budapest: most promising and challenges

D1.3 Organizing workshop, seminar & training

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Active packaging leaflet discussions:

- picture of first page: use logo, ask designer
- In the first page: change where is active packaging, vote: keep berries
- attract with the first page, why I should invoice
- text is kind of suspicious

Intelligent packaging

- more bullet points
- limit text

Leaflet for safety/legislation:

- on going
- same organization

Translation in local languages: a list of volunteers has been created; these will be contacted by Diana Gregor Svetec for the translations of the leaflets.

The rest of the time was dedicated to **WG3** presentation of first results of LCA of 3 demonstrator products:

1. Intelligent packaging for meat product – tray with indicator and detection of bacteria label

3 cases tested:

- Normal packaging without indicator – packaging is disposed on BEST BEFORE date
- Packaging with indicator – indicator shows the meat is not fresh one day after BEST BEFORE date
- Packaging with indicator – indicator shows the meat is not fresh two days after BEST BEFORE date

Indicator scenario takes into account that the indicator may switch on before the BEST BEFORE date due to poor storage conditions or some problems along the packed meat value chain with flat rate of 10% of all cases.

As per Marcos comment the same should be done with normal packaging scenario – people can open the meat packaging and probably detect that it went wrong, although the probability of this should be smaller – 5%.

Problems and limitation of this study:

- No data about the actual indicator itself!!

Even though, it is probable that it will not have a very significant impact on the whole analysis, we need this urgently for the LCA to have sense!!

- Assumptions made can be changed, we can even devise more scenarios – we have to make a list
- End of life impact is still missing – it will be modeled soon

Results show that there is slight environmental benefit of using the indicator, and that our assumptions have a big influence on the end result.

2. Active packaging for bread – oxygen scavenger

2 cases tested:

- Packaging without active component – bread has preservatives
- Packaging with active component – bread does not have to have preservatives in order to maintain the same quality and shelf life.

Problems and limitation of this study:

- Data about Oxygen Scavenger obtained, however – processing data – energy consumption – is still missing.
- Missing data about bread preservatives processing – i.e. how and when the preservative is inserted into the flour – is it a separate step in bread production?
- End of life impact is still missing – it will be modeled soon

Interestingly results show that there is actually negligible difference in favour of packaging with active component. Additional data about processing of both active packaging and preservative insertion may change this.

3. Active packaging for strawberries – corrugated board with antimicrobial / anti mould layer

3 cases tested:

- Traditional corrugated board packaging without active component
- Corrugated board packaging allows to reduce strawberries wastage by 35%
- Corrugated board packaging allows to reduce strawberries wastage by 70%

Problems and limitation of this study:

-
- No data about the actual indicator itself

Even though, it is probable that it will not have a very significant impact on the whole analysis, we need this urgently for the LCA to have sense

- Assumptions made can be changed, we can even devise more scenarios – we have to make a list
- End of life impact is still missing – it will be modeled soon

Results show a more pronounced environmental impact of traditional corrugated board packaging in comparison to both active component scenarios.

In order to finalise the LCA's, WG3 needs more input on the actual components and discussion on possible scenarios. WG3 leader will prepare more cases with more – worst and best case scenarios and alternatives. Based on that the actual scenarios used for the final LCA study have to be selected on next meeting. Final results of the study will be published in Packaging Spectrum Magazine.

In addition to that WG3 will also prepare brochure similar to the one from WG1. Group will also prepare a sort of road map based on the LCA results to show important sustainability and health and safety issues that can occur in the value chain and life cycle of active and intelligent packaging.

11:00-13:30 Working groups discussions – WG2

The topic Legislation we left out of scope as you and Sara are doing great with the leaflet. Also, Katherine Flynn agreed to help!

Divided the group into 2 to discuss the remaining topics:

#1 to discuss market demands and supply chain challenges: Mika Vähä-Nissi, Anouk Dantuma, Eugenijus Jurkonis, Dulce Antunes, Cristino Dorés, Cornelia Vasile, Tamara Geric, +3 ???

- o Demoing the potential for extended shelf-life needed. Show in true testing - seeing is believing! Increasing awareness among the companies.
- o Co-operation along the brand owners, machine and solution suppliers needed.
- o Packaging suppliers in key position, although packaging machine dictate suitable materials.
- o Costs – or rather revenues – in the long term important.
- o Micro-companies and smaller specialized producers often more flexible, while big companies are slow to adopt new technologies, or the solutions support more basic needs (e.g. RFID for logistics).
- o Critical batch size of new solutions often limiting interest -> flexibility and small batch size management important.
- o Possibility for new players in the value chain.
- o Understand the differences between active and intelligent solutions; making the best out of both. For example, discounting products approaching end-of-life.
- o “Green-yellow-red” approach can be confusing; rather clear claims such as “Without additives”.
- o Think also out of box. For example, non-food products and inertia sensors for electronics and secondary packaging.

#2 to discuss consumer expectations: Sanne Tiekstra, Siv Lindberg, Maria Radsten Ekman, Karin Edstrom, Rozalia Szentgyorgyvolgyi, Ana Dopico, Macu Arnedillo



Very short time unfortunately, so we only focused on the first column in the table; issues that should be taken into account:

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- o Industry wants to control the freshness control (indicators), they don't want the consumer to see it in the stores.
 - o Trust of consumer in the packaging system / product / indicator.
 - o Transparency: if industry does not want to be transparent with consumer what the label actually shows. >> might this be a problem legally for the manufacturer? Because you have to inform them about safety, give consumer safety, and you are obliged to take care of the problems (which you are aware of if you collect the information >> generating the information, once you have it you have the responsibility to share it and act upon it). Responsibility shifts from manufacturer to consumer.
 - o Will the consumer still use its own senses or only trust the sensor?
 - o Not black and white (good and bad), or should it be degree of freshness. More focus on positive (still acceptable by law so safe for you), rather than negative. Marketing: give discount. But: if product says "30% fresh" or "ok till tomorrow", it is completely different to consumers (psychology). >> what would consumers say? Acceptance range, how people think about freshness. Depends on product type. More reasonable for meats and so on where you cannot use your senses (e.g. with fruits).
 - o Perception of types of indicators.
 - o For active packaging: does the consumer matter how it is kept fresh? In the end no, but it depends how it is communicated on the packaging.
 - o Communication : how do you communicate the message >> can be tackled by involving experts in communication.
- IKEA: smart packaging because it contains everything (recyclability, economically transportable, communication what packages to get, how to assemble the product; and it is for everybody). But IKEA does not sell the product by the packaging.
- o Legislation: in cases you don't want to communicate things, but you are obliged to by law, even in several languages (right to be informed, but you should also make it accessible). Can also be a problem in terms of limited space on the packaging.
 - o Different ages of consumers (maybe older people care more, but information might be less accessible).
 - o Healthy lifestyle in western communities: how to make active packaging fit in. >> it is about trust issue.
 - o People might be worried about things that are being processed, because you don't know what you are eating. >> so what about active packaging.
 - o Education, in relation to AIP, making people accept things. Make them aware it is in everything.
 - o Who should be the person to say it is ok; who do people trust? Who should educate?
- Trust issue again.

Some comments in general:

- Ana Dopico & Slovakian research group (Jan Parobek) will focus on quantitative research and start to collect research with all conclusions to make information available.
- RI.SE is starting BIO-SMART project and could share results with COST and also include our questions during the consumer research.

11:00-13:30 Working groups discussions – WG4

| WG4 – Jerusalem 7.- 9.11 2017 | WG4 – Jerusalem 7.- 9.11 2017 | |
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| <ul style="list-style-type: none"> • To do's (from discussion in Jerusalem): <ul style="list-style-type: none"> – More dissemination shall be done via: <ul style="list-style-type: none"> • Videos • Social media • Through ambassador activities, towards broader public – The standardized leaflets will be translated into languages of participant countries | <ul style="list-style-type: none"> • To do's (from discussion in Jerusalem): <ul style="list-style-type: none"> – Contact CEPI and us them for dissemination to industry – Participate in the ILSI 2018 annual meeting? – Use targeted publication for the EU parliament | |
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13:30 Closure

Industry feedback:

Nestle (OSEM): no benefit (yet) obtained through active packaging, so at this moment they need a very good reason to use it. Obstacles they experience are:

- Price
- Shelf life of package itself is not known (and storage might affect active technologies)
- Consumer will see the package
- Off flavor >> how do essential oils influence the products