Announcement of upcoming demonstration session

The **WHEYLAYER** consortium is delighted to announce the first public demonstration of the **WHEYLAYER** materials and process targeted at plastic manufacturers, processors and recyclers, packaging and food producers, as well as experts from these sectors. This demonstration session will be held between two industrial plants in Slovenia (exact date to be confirmed on the project website soon).

The **WHEYLAYER** industrial partners will provide an insight into the context of the research by reviewing the technologies for whey protein extraction from whey, a by-product from cheese manufacturing, and the state-of-the-art in terms of plastic recycling. The session will then explore the results and outcomes of tests conducted by the project with respect to WHEYLAYER-based films used in the packaging of foodstuffs, as well as the general barrier and mechanical properties of the novel material. Participants will have the opportunity to judge WHEYLAYER's impressive performance in comparison with currently available solutions on the market today.

Practical demonstrations will show how the whey coating can be applied and how this film can subsequently be laminated and converted into the final packaging item. Participants will get the unique opportunity to view the production process from start to finish. They will also be trained on exactly what modifications are necessary to incorporate this innovative technology into their production line. They will also have the chance to interact and speak with the people behind the **WHEYLAYER** breakthrough development.

Finally, the multiple advantages that **WHEYLAYER** brings in term of the recyclability of packaging will be explained, along with the results of a detailed life cycle assessment. To wrap up, an external packaging expert will conclude the session, discussing the future of the packaging technology. Participants can witness first-hand the many environmental benefits that **WHEYLAYER** will bring to the sector and be the first to ascertain how this new development will affect their businesses in the future.

Don't miss this unique opportunity and stay ahead of your competitors! Register your attendance to this free demo session today! (email: ebugnicourt@iris.cat)

Further national workshops will be organised in September and October in Catalonia, Hungary and Italy (more information will be announced on www.wheylayer.eu)

About the **WHEYLAYER** project

WHEYLAYER is a collaborative 3 year research project that commenced in November 2008 and is being funded by the European Commission's Seventh Framework Programme under "Research for SME-Associations" (Grant Agreement n° 218340-2).

The consortium comprises 14 partners from 7 EU Member States and Turkey and includes research providers, industrial associations and SMEs. It is being coordinated by Catalan SME Association, Patronal de la Petita i Mitjana Empresa de Catalunya (PIMEC).

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www.wheylayer.eu

WheyLayer® Project News
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ttz Bremerhaven

Editorial

WHEYLAYER: Showing the European Plastics and Packaging industry the "*whey*" forward!

WHEYLAYER is an exciting 3 year R&D project, which is being funded under the Research for SME Associations programme, and that has developed whey protein-coatings to be used as barrier layers in multilayer films to increase their recyclability due to their biodegradability.

As the **WHEYLAYER** project approaches its final 6 months, Oonagh Mc Nerney, Director of IRIS, explains that IRIS is very excited to see this novel idea, which initially emerged in 2007 from the needs of various industries, getting closer to the market. IRIS, a Spanish-based technological company, quickly identified that **WHEYLAYER** could provide a joint solution for a number of current industry challenges: the reuse of whey, a by-product of the dairy industry; the low recyclability of plastics used in the food packaging industry; and, market demand for food with a longer shelf life. Aware of the potential impact that **WHEYLAYER** could have, IRIS secured the interest of associations, SMEs and research performers from the plastics, packaging and dairy sectors in forming a consortium that could drive the concept forward.

Having featured the impact of **WHEYLAYER** on the dairy industry in its first issue, this second newsletter focuses on the impact for the packaging industry. Results of tests into the recyclability and the properties of the new **WHEYLAYER** material, as well as into its suitability as a food packaging material, are central themes of this edition. Moreover, in the coming months the **WHEYLAYER** consortium is gearing up to demonstrate **WHEYLAYER** as a sustainable packaging solution to the packaging industry.

Elodie Bugnicourt, IRIS, Supporting Coordinator

Watch out for **WHEYLAYER** on **Euronews**! We will feature in the Innovation Programme for 4 weeks, commencing April 25th.

WHEYLAYER is now a **PATENT PENDING** technology

CONTENT

A word from the WHEYLAYER industrial partners from the packging sector

Joze Ban, Director, Lajovic Tuba Embalaža d.o.o.:

Lajovic Tuba Embalaža d.o.o. (Tuba) is Slovenian company with more than 85-years tradition in producing aluminium, plastic and laminate tubes as well as aluminium aerosol cans.
Our main goal is to provide a complete service in the field of packaging to our customers, who are predominantly from the pharmaceutical, cosmetics, food and chemical industries. To remain competitive, it is vital to be able to provide the market with new solutions, additional services and product innovations. To this end, we are investing more and more resources in research and development. In line with this, Tuba was invited by the Plasttechnics Cluster of Slovenia to participate in the **WHEYLAYER** project

The use of this new biodegradable material looks set not only to lower energy consumption but will also lead to more recyclable and fully compostable solutions, thereby adding huge value for our customers and consumers. In addition, we believe that the **WHEYLAYER** project results have the potential to add value to packaging used in the cosmetics industry, where Tuba is already very much present. As a result, soon after the demonstration of the results of the **WHEYLAYER** project in July 2011, we plan to approach a number of key cosmetics brand manufacturers to initiate the development of a new natural/organic packaging solution that will be biodegradable and sustainable. It's a win-win partnership with **WHEYLAYER**.

We believe that the **WHEYLAYER** project results will help our company to hit on and implementing more new ideas for this highly demanding market.

Enrique Romero, Commercial Director, Serviplast:

The packaging business is moving increasingly towards more sustainable solutions. Our customers are also seeking alternatives to expensive synthetic barrier plastics. As a small company specialised in thermoforming packaging solutions for the pharmaceutical and food sectors, alone, Serviplast would never have been able to undertake the development of a new material that would meet such requirements.

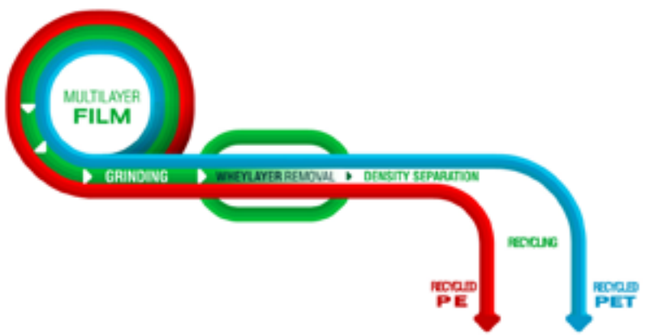
Once the research partners were in a position to provide us with the new material, we were more than happy to test it! We have been able to successfully thermoform blisters, which are currently being tested in our pharmaceutical applications and compared with conventional materials.

As Serviplast is currently in the process of expanding its food packaging line, we plan to use the WHEYLAYER-based material to manufacture trays in the future. We expect these trays to be of particular interest for cheese producers- they will be able to pack their cheese with a material obtained from a by-product of the cheese-making process itself: whey.

It is our belief that **WHEYLAYER** could have a massive impact on the packaging market by creating a true benchmark in terms of a recyclable barrier multilayer plastic that does not compromise on the other properties and that involves the same processing. While it may take a bit longer to introduce these new materials for packing food and pharmaceuticals due to the lengthy approval process, we are already quite confident that **WHEYLAYER** is a winner!

Focus on…

Increasing recyclability of multilayer packaging



As part of the WHEYLAYER research, the University of Pisa demonstrated that by using an enzymatic agent it is possible to remove the whey coating from the polyethylene terephtalate (PET) substrate by washing at room temperature, and that this washing process will not degrade the structure of the polymer, even after a 24-hour treatment. Similar tests were performed on polyethylene (PE) films and results confirmed that there was no degradation of the polymer when washing with enzymatic detergents. Corresponding enzyme types, concentration, time, temperature and pH-optima were determined in order to deliver a highly efficient process that is applicable to industrial waste recycling,

The degradation of the whey as an interim layer in a sandwich configuration was also confirmed as possible, thus achieving one of the main goals of the project: the ability to separate and recycle independently different synthetic layers that have been combined by WHEYLAYER, with no significant loss of properties.

The project is also addressing the development and assessment of a complete biodegradable packaging solution by using Polylactide Acid (PLA) substrate films. PLA forms biodegradable films and foils that could substitute polyolefin films. The application of a WHEYLAYER coating could improve packaging functionality, especially in terms of resistance to gas permeation, which is currently one of the limiting properties of PLA films.

Commercial films based on PLA were coated with WHEYLAYER and submitted to biodegradation tests according to "ISO 20200 Plastics- Determination of the degree of disintegration of plastic materials under simulated composting conditions in a laboratory-scale test". Composted samples underwent full disintegration and had no effect on compost quality for its use as a fertiliser in open fields.

Mineralisation tests in liquid medium extracted from compost inoculums evidenced complete degradation of the whey component in the first 15 days of the test, as would be expected from a protein-based material with high nitrogen content. In conclusion, WHEYLAYER has a positive effect on the degradation of a sample based on a biodegradable polymeric matrix.

Validation of the WHEYLAYER-based material for food contact

Assessing modifications to the flavour of foodstuffs due to packaging

ttz Bremerhaven tested different meat, dairy and convenience foodstuffs in order to validate the WHEYLAYER-based packaging material. All of these products require packaging films with high oxygen and water vapour barrier properties.

The products were packed in a WHEYLAYER-based film, as well as industrial reference materials currently used by food packers. From the meat sector, sausages that undergo a post-packaging pasteurisation process were selected in order to test WHEYLAYER's resistance to hot conditions.

Buttercheese was selected as a product from the dairy sector as it has a mild flavour and any differences in taste due to packaging would be quickly determined. In addition, an active antimicrobial layer containing lysozyme and EDTA was applied on the food contact surface of the WHEYLAYER-based film to extend the shelf life of the packed cheese. Finally, fresh pasta was selected as the convenience food of choice. These tests are currently on-going at ttz.

Intensive sensory, microbial, chemical and physical analyses were frequently performed on the different packaging solutions during storage.

How is the packaging´s influence on taste assessed?

The sensory analysis at ttz Bremerhaven was performed by applying a combination of triangle testing (DIN EN ISO 4120) and product profiling (DIN 10967) over storage time. The triangle test provides qualitative data as to whether there is a sensory difference between products stored in the WHEYLAYER packaging compared to the reference or original packaging options. The profiling can zoom into specific sensory attributes and qualify the differences observed. A group of people with particular aptitudes (panel, DIN 10961) were specifically trained for the characteristic sensory attributes of the test food product. They ranged the intensity of characteristic attributes of appearance, taste, smell, mouth feel and texture on a scale of 0 to 5, where 0 refers to the absence of the attribute and 5 to the maximum occurrence. All analyses were performed in specific sensory cabinets with controlled temperature, humidity, pressure and light in order to minimise external influences on the sensory results.

Taking the buttercheese as an example, independently of the packaging solution, its sensory profile changed over time due to further ripening of the product imparting a creamier, softer and melting-in-the-mouth feel. However, the WHEYLAYER packed cheese (with and without antimicrobial coating) tended to be less sour and bitter than the one packed in the reference material, and, as such, was more appreciated by the panel.

In the future, findings from specific sensory attributes will be correlated with the analysis of volatile aromatic compounds from gas chromatographic-mass spectrometry (GC-MS) analysis to understand the reason for differences in taste.

Microbial, chemical and physical changes

A poor oxygen barrier of a packaging material leads to higher oxidation rates and thus rancidity of the packed product. Peroxide and acidic values were measured as indicators for rancidity. In all tested products peroxide or acidic values were similar. A poor water vapour barrier of a packaging material could lead to the packed product drying out. During storage no differences in dry matter or free available water were observed. These results are consistent with the fact that WHEYLAYER-based films are comparable with conventional multilayer films in terms of barrier properties. This, together with the results from the microbiological, mechanical and optical analyses, confirmed the potential of the whey coating to be successfully used in food packaging to replace synthetic polymers.

Previously reported recycling and food contact tests were carried out on WHEYLAYER coated and multilayer films prepared at Fraunhofer IVV Institute as described in the first issue of the project newsletter.