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NEWSLETTER Nº 1

LIFE EGGSHELLENCE

AN EXAMPLE OF INDUSTRIAL SYMBIOSIS AND MODEL CHANGE TOWARDS CIRCULAR ECONOMY

WHAT IS LIFE EGGSHELLENCE?

The LIFE EGGSHELLENCE project which is financed by the LIFE programme Ref: (REF: LIFE19 ENV/ES/000121) has as its main objective to demonstrate the technical feasibility of the use of eggshells as a secondary raw material in the manufacture of wall tiles. We find that egg processing companies generate a significant amount of eggshell waste in their process that is not valorised (150,000 tonnes per year in Europe), and through the development of LIFE EGGSHELLENCE we can establish an industrial symbiosis between the ceramic and egg processing sectors that will help us in the transition towards a new circular economy model. In other words, with those eggshell wastes that are not reused, we can create a sustainable ceramic product.

To do this, it is necessary to develop a device that allows eggshell pre-treatment in order to separate the biological membrane from the shell, obtaining calcium carbonate from a waste product from the food industry that can be used as a secondary raw material in the composition of ceramic tiles, so as to avoid extracting these virgin raw materials and make use of a waste product as a resource for manufacturing a product, in this case, ceramic tiles.

WHO PARTICIPATES IN LIFE EGGSHELLENCE?

ITC-AICE, the Instituto de Tecnología Cerámica, is the coordinator of the project. It is a research centre whose mission is to provide solid support to the ceramic sector in defending and improving its strategic positioning in the current global context, mainly through R&D actions that foster innovation In addition to coordinating the project, its activity will focus on the design of the prototype; the development and characterisation of ceramic compositions incorporating bio-$CaCO^3$ for pre-industrial and industrial testing and Life Cycle Analysis.

The company AGOTZAINA, S.L. produces high quality egg products. As a result of their awareness of environmental problems, they are committed to reducing waste. They are involved in the mapping of the egg-processing and ceramics industries and in the design, implementation and testing of the prototype for the separation of the membrane from the eggshell, which will be placed in their facilities. They supply the treated eggshell for the industrial trials and lead the replication strategy.

ADELINO DUARTE DA MOTA (ADM) is the leading producer of ceramic raw materials and compositions in Portugal.
It has extensive experience in the supply of raw materials and the formulation of compositions for the entire ceramic industry. ADM will be the end user of the new bio-$CaCO^3$ produced. Its role in the project will be focused on the design, validation and production of the new ceramic formulations at pilot and industrial scale.

The company EUROATOMIZADO, S.A., is the largest entity at national and international level in the design, production and commercialisation of ceramic compositions. They will act jointly with ADM as end users of the new bio-$CaCO^3$ obtained, in fact, they could absorb all the eggshell produced in Spain.

They participate in the design, validation and production of the new ceramic formulations at pilot and industrial scale.

In addition, the machinery manufacturer MAINCER, S.L., which designs, develops and manufactures industrial machinery for different industries, mainly producers of ceramic tiles and frits, glazes and ceramic pigments, is in charge of designing and building the necessary prototype for the separation of the membrane from the eggshell, also participating in the replication of the project.

Also relevant in the consortium is the University of Aveiro (UA), which has developed an innovative technology to incorporate eggshell waste in the formulation of ceramic materials.

It is probably the best equipped institute in Portugal to carry out research in materials science. Its role in the project focuses on the industrial scale-up of the developed technology, the review of the state of the art in relation to eggshell separation systems and the design of ceramic compositions for subsequent validation, at pre-industrial and industrial scale, in ADM.

INTERVIEW WITH DR. FRANCISCA QUEREDA, MAIN RESEARCHER OF THE LIFE EGGSHELLENCE PROJECT AT ITC-AICE.

Dr. Francisca Quereda, principal investigator of the LIFE EGGSHELLENCE Project at ITC-AICE.

How was the idea of starting this project, or as you have been asked, with a certain humour, what came first, the chicken or the egg?

Well, it is true that some people may be surprised that we have been inclined to study the technical feasibility of using eggshell waste as a new resource for ceramic tiles but LIFE EGGSHELLENCE actually arose because we identified a need, namely a problem in the egg processing industry, as it is estimated that around 150,000 tonnes of eggshells are generated in Europe and are disposed of in landfill sites. They often cause problems, such as bad odours or growth of bio-organisms, which lead to complaints or demands. Spain and Portugal, the countries involved in this initiative, are currently producing

5,500 tonnes of eggshell waste per year in the case of Portugal and 16,000 tonnes per year in the case of Spain. This waste represents an added cost for a medium-sized egg production company of between €50,000 and €200,000 per year as a result of the cost of transport and landfill (€25-100 per tonne).

LIFE EGGSHELLENCE, in addition to avoiding the landfilling of shells by transforming them into secondary raw materials, takes into account the need to protect virgin and non-renewable raw materials as it will reduce the extraction of mineral carbonate. We have the advantage that the members of this consortium have significant previous experience in the field of ceramic processing and waste recovery.

This is what encouraged us to take this idea forward: to recover eggshell waste and reuse the calcium carbonate present in them to obtain a sustainable ceramic material.

How do you plan to solve this problem, what can LIFE EGGSHELLENCE do?

The company MAINCER, S.L. is designing a device to separate the biological membrane from the eggshell, which contains the calcium carbonate, and to process it to be used in the ceramic compositions. We expect the equipment to be operational in the first quarter of 2022.

Preliminary design of the prototype for separating the biological membrane from the eggshell (MAINCER, S.L.).

This would initially benefit egg-processing companies in Spain and Portugal, because if they adopt this solution, they could be part of the process of industrial symbiosis between the food and ceramics industries. The company AGOTZAINA, an egg-processing company member of LIFE EGGSHELLENCE, expects a waste reduction of at least 90%, i.e. around 2,500 tonnes per year. To this amount we have to add those of other egg-processing companies that are involved in the replication of the project. The idea is that we can recycle 5,400 tonnes per year of eggshell in Portugal, as the two main egg processing companies in this country are involved in the replication of the project, while in Spain we would reach 5,600 tonnes/year of recycled eggshell.

In the case of the Portuguese ceramics industry, this calcium bio-carbonate extracted from eggshells would represent 18% of the total use of this raw material (around 30,000 tonnes per year), while in the case of Spain, it would replace 4% of the total, estimated at 150,000 tonnes per year.

In this way, LIFE EGGSHELLENCE will enable industrial symbiosis, achieving a circular economy between two sectors that will generate two new value chains and new business models that can be replicated on an international scale.

I would like to highlight that on 16 December 2020 we created the Stakeholders Advisory Board Working Group, an Advisory Board whose motivation is to detect the needs and interests of the egg processing industries. The entities involved are associations and egg-processing and ceramics companies that have shown their commitment to study the replication of the project. We are also trying to involve waste management authorities to be part of this board and to support the implementation of the solution developed in the project.

WE HAVE BEEN IN...

CONFERENCE: "EUROPEAN FUNDING OPPORTUNITIES 2021-2027". ORGANISED BY THE PROVINCIAL COUNCIL OF CASTELLÓN. 25/02/2021.

WE HAVE BEEN IN...

17TH INTERNATIONAL CONFERENCE RRB 2021 (RENEWABLE RESOURCES AND BIOREFINERIES). BIOBASED MARKET, 06/09/2021. SANTIAGO CAMPUS OF THE UNIVERSITY OF AVEIRO (PORTUGAL).

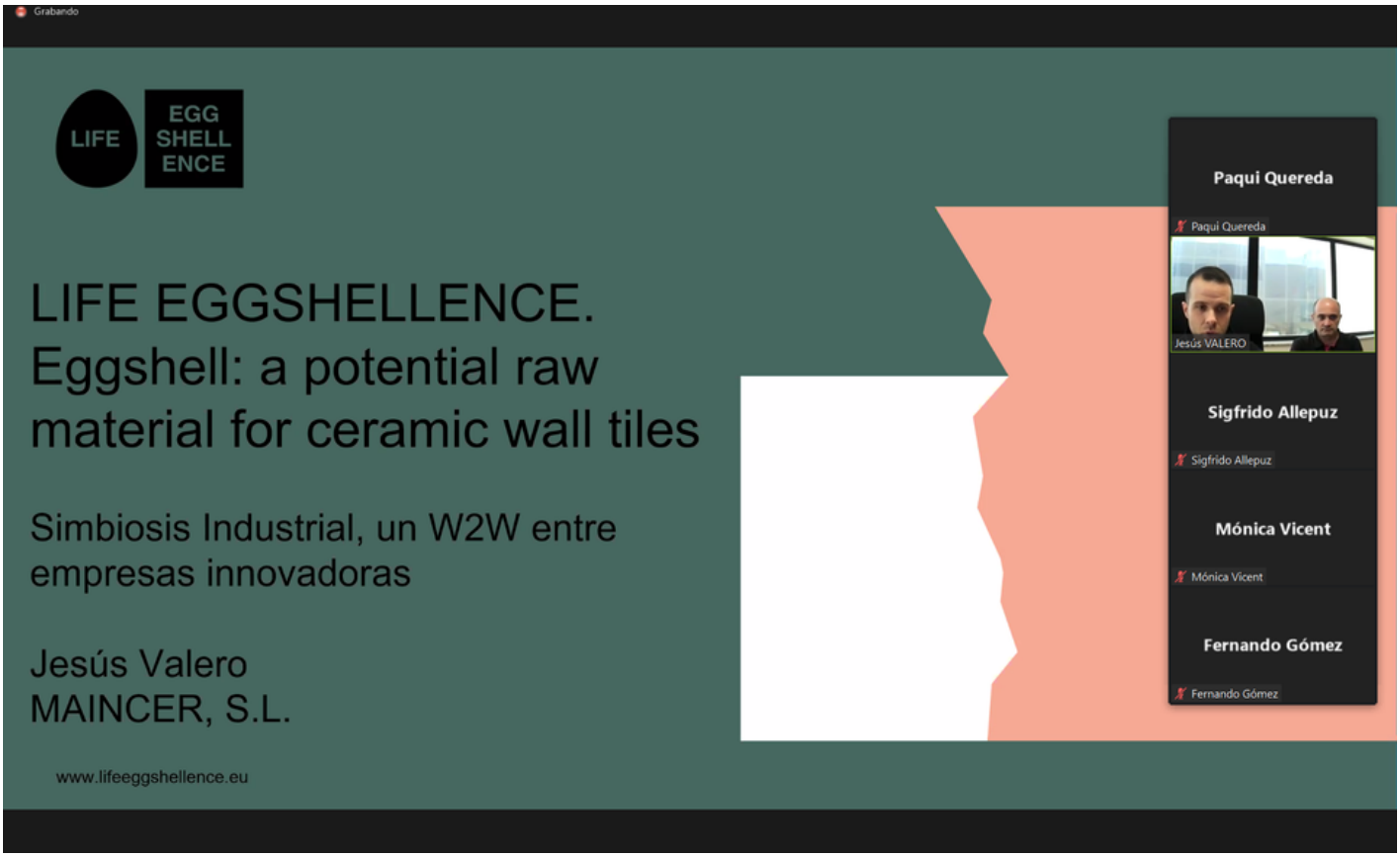
An experience in which companies, start ups, institutes, research centres, have been able to present their innovative projects in terms of bioproducts or bio-based products, i.e. materials, chemical products and energy derived from renewable biological resources.

WE HAVE BEEN IN...

PRESENTATION OF LIFE EGGSHELLENCE, 17/09/2021

In the framework of the LIFE Infoday organised by REDIT, the Network of Technological Institutes of the Valencian Community.

WE HAVE BEEN IN...



ENTREPRENEURSHIP WITH TALENT FORUM CYCLE ON CIRCULAR ECONOMY, 1ST SESSION: INDUSTRIAL SYMBIOSIS, A W2W BETWEEN INNOVATIVE COMPANIES. 22/10/2021

Specifically, the presentation was entitled: "Industrial symbiosis in waste from egg products" and was given by Jesús Valero, from the company MAINCER, a participant in the project.

This initiative was organised by CEEI Castellón, financed by the Instituto Valenciano de Competitividad Empresarial de la Generalitat Valenciana (IVACE) with the collaboration of the Instituto de Tecnología Cerámica (ITC-AICE), the Provincial Council of Castellón and the Asociación Nacional de Técnicos Cerámicos (ATC).

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WE HAVE BEEN IN...

1ST ANNUAL MEETING OF THE LIFE EGGSHELLENCE PROJECT. ONLINE-PRESENTIAL ATTENDANCE MODALITY. INSTITUTO DE TECNOLOGÍA CERÁMICA (ITC-AICE), 25/10/2021

WE HAVE BEEN IN...

PRESENTATION OF LIFE EGGSHELLENCE AT THE CONFERENCE ON "SUSTAINABILITY IN THE CERAMIC SECTOR" 04/11/2021

Conference "Sustainability in the Ceramic Sector" organised by the Universitat Jaume I and the Instituto de Tecnología Cerámica on 4th November 2021.

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