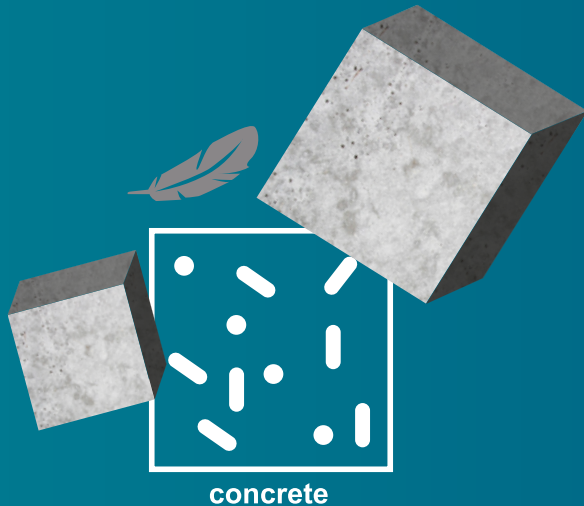




LIGHTCOCE

**Building an Ecosystem
for the up-scaling of lightweight
multi-functional concrete
and ceramic materials and structures**



The Future of Concrete

Contents

This is the second edition of the newsletter related to the LightCoce Project.

This issue is dedicated to an overview of concrete, focusing on the challenging aspects of the sector and the innovative solutions developed within the industry. Moreover, a summary of the dissemination activities run by the partners is made and the main progress made by the project are stated.

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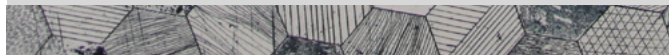
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 814632.

LightCoce Newsletter n° 2
July 2020



What is LightCoce project?

LightCoce is a research project funded by the European Community under the H2020 program, with the aim of creating an ecosystem of business innovation capable of upscaling and testing new multifunctional lightweight materials for SMEs.



How LightCoce helps you overcome complex standards and regulations?

Standardization and regulatory compliance are key issues for further exploitation and commercialization of innovations. Testing will be in alignment with international standards (CEN, ISO, ASTM, etc.) and regulatory framework aiming to develop products towards EU standards.



Which is the target market of LightCoce?

LightCoce can address different types of customers such as: Banks, Funds / Investors, Incubators / Accelerators Public Bodies and Owners of Infrastructures Research institutes / Universities, Large Enterprises, SMEs, Startup / New Ventures Industrial Associations or Groups Raw Materials Providers.



Do you need to innovate your business?

Innovation services are open access under specific fees to all parties, such as: development of business model, marketability assessment, suggesting technology to enable your value proposition or embodying it in a product/service in favour of the user, ensuring the proper protection of the IP developed and identifying the funding opportunities at local or EU scale.



Can large-scale modeling help you evaluate new opportunities?

The Modeling Group focuses on process modeling and simulation through the development of holistic models of processes through multi-scale modeling of materials and unitary operations. Moreover, predictive modeling at different levels will be implemented to generate a chain of models that lead to full-scale simulation of real structures, to evaluate the overall performance of solutions at a global level.



Which professionals can benefit from LightCoce services?

The relevant reference markets are different, such as: Construction industry, Bricks and Tiles industry, Aerospace industry, Automotive industry, Defense industry.

The Future of Concrete

The challenges of Concrete

In the past twenty years, concrete has seen an unprecedented and incredible evolution, representing one of the pillars in the development of our societies, from the point of view of high rises, infrastructures, and residential buildings in their foundations, if not the entire buildings themselves. It is produced more concrete than any other synthetic material on the hearth with relevant growth potential, in particular for the emerging countries.

The global construction sectors are facing several challenges in terms of infrastructures that are the foundation of our societies, what makes social and economic life possible, connecting people in businesses and communities. Starting from the point that, actually, it seems to be no alternative material able to replace concrete, there is room for its improvement in terms of efficiency and effectiveness. It is estimated that in the next ten years, it will be needed significant investments, larger than the actual value of the worldwide infrastructures to keep up with the global GDP growth as projected. This aspect will have several implications, in particular, for its perceived controversiality. Because of its emblematic role in the modern cities' development, concrete will have to face issues related to eco-sensitivity and sustainability for its contribution in terms of CO2 emissions

and its impact on climate change. The significant environmental footprint of concrete depends on the increase in the level of the volume in which is used. Future researches in concrete sciences will have to cover these issues, developing binders less CO2-intensive and energy-intensive, decreasing the weight of concrete-realized materials and reducing the emissions from their transportations and the construction processes in which they are involved. This exploration of the science-based and the technology-based changes in the concrete's construction practice. This transition will also have a positive impact on the concrete's image and on its societal acceptance.

Innovative concrete solutions

Innovations in the concrete industry have created products with brilliant performances both in terms of the properties on the mechanical side and on their durability. This positive trend has not only generated improvements in the production process in terms of mixing easiness or workability, but it has also reduced the carbon emissions in concrete and cement manufacturing. A relevant aspect if we consider that the cement industry alone generates more than 8% of the total carbon emissions worldwide. In order to properly investigate the concrete industry and its innovations, in the next paragraphs, we are going to cover

innovative applications and their implications or the sector.

In this framework, an interesting scenario is the one developed by Van Damme (2018) with its implementation methods and with its researches in terms of “digital concrete”. The author suggests an increasing introduction of the robotic fabrication method, together with digital technologies embodied in the concrete materials. With these high-technology materials, several innovative solutions can be introduced, developing machine deep learning capabilities and coupling useful massive data collection to better optimize concrete and its technologies.

Another interesting and innovative solution can be the “Self-compacting concrete” (SCC) that Geiker and Jacobsen (2019) consider as the “concrete of the future”. In fact, SCC is a tailored concrete with special properties in its fresh state, flowing into the formwork under its own weight, remaining homogeneous, and not being vibrated as conventional concretes. This improves the quality and efficiency in the working environment during construction, providing larger freedom from the architectural point of view in terms of the structural design.

The general increasing concerns for sustainability but also for safety have led scientists to develop materials able to self-healing in a smart and preventive way. At a certain point, independently

on their mixture levels, concrete will crack. The appearance of cracks, in the vast majority of the cases as small ones, does not mean that there is a risk of collapse for the entire structure but can lead to a lack of functionality, diminishing their overall service life, and their sustainability. In 2016, Professor Jonkers, from the University of Delf, developed the first self-healing concrete. In this framework, the healing process is stimulated by autogenous healing, through mineral additives, crystalline admixtures, or absorbent polymers, and subsequent autonomous self-healing mechanisms, for example, with the application of micro polymers, minerals, or bacteria encapsulated.

Sources:

Van Damme H. 2018. “Concrete material science: Past, present, and future innovations.” In *Cement and Concrete Research*, 112, 5-24. DOI 10.1016/j.cemconres.2018.05.002

Geiker M., Jacobsen S. 2019. “Self-compacting concrete (SCC)”. In *Developments in the Formulation and Reinforcement of Concrete* (pp. 229-256). Woodhead Publishing. DOI 10.1016/B978-0-08-102616-8.00010-1

De Belie N., Gruyaert E., Al-Tabbaa A., Antonaci, P., Baera C., Bajare D. and others. 2018. “A review of self-healing concrete for damage management of structures”. In *Advanced materials interfaces*. 5(17). 1800074. DOI 10.1002/admi.201800074

35

Billion: Tons of Concrete used in construction every year



5

Percentage of concrete wates recycled



1,6

Billion Tonnes of Carbon generated by the industry worldwide



7,5

Billion Cubic Meters of Concrete made each year



600

Billion of Dollars: ready-mix concrete industry value projected by 2025

8

Percentage of Total Carbon Emission made by concrete industry



Geiker M., Jacobsen S. 2019. “Self-compacting concrete (SCC)”. In *Developments in the Formulation and Reinforcement of Concrete* (pp. 229-256). Woodhead Publishing. DOI 10.1016/B978-0-08-102616-8.00010-1

Breaking News



3rd Plenary Meeting, June 30th - July 1st

On the 30th of June and the 1st of July the 3rd Plenary Meeting of LightCoce took place. Originally planned to be hosted by NTUA at their premises in Athens, the event was held entirely online because of travel restrictions due to the still ongoing spread of COVID-19. During the two-day meeting the expert formonitoring Angel Rodriguez and the Project Officer Mario Markakis took part to the discussion and help the partners in shaping future actions. All the WorkPackages have been discussed and the status of the project resulted to be consistent to what expected and described in the DoA. The main project's update is the decision of shifting from an NPO to a spin-off for the legal form of the entity that will act as SEP and run the Ecosystem.



The LightCoce project disseminates its activity at the QUALICER 2020 World Congress on the Tile Quality

The LightCoce project presented a communication at the QUALICER 2020 World Congress on Tile Quality, held on 10th and 11th of February at the Castellón Chamber of Commerce (Spain). The title of the poster was: "Light Coce: building an ecosystem for scaling multifunctional and lightweight building materials". Organised by the Castellón Chamber of Commerce and the Superior College of Industrial Engineers, the QUALICER congress welcomed more than 600 congress members from countries almost all over the world on its 30th anniversary. The ITC had an outstanding participation through a stand where it presented its R+D+I work and through oral communications.



The LIGHTCOCE project has disseminated its activity at the 7th edition of CERÁMICA INNOVA 2020

The Instituto de Tecnología Cerámica (ITC), as a participant in the European project LightCoce, has taken part in the international Technological Forum CERÁMICA INNOVA 2020. The Forum took place at the stand of the Spanish Association of Manufacturers of Machinery and Equipment for the Ceramic Industry (ASEBEC), with the participation of the Network of Technological Institutes of the Valencian Community (REDIT), the ITC itself and with the support of SEIMED, the Enterprise Europe Network. In addition to LightCoce Project, presented through an oral communication in the workshop held on February 6th in Cerámica Innova, it should be noted that several studies developed by researchers from the ITC, companies and other research centres were disseminated.



The LIGHTCOCE project has disseminated its activity at CEVISAMA 2020, one of the most important international events for the ceramics sector

The Instituto de Tecnología Cerámica (ITC), as a participant in the European project LightCoce has developed various communication actions at the sectorial event CEVISAMA 2020 (3rd-7th of February, Feria Valencia-España). The ITC, in its stand located at a privileged point in the CEVISAMA Trade Fair (in a distributor at the main entrance) was also present with a staff of experts from its group of researchers in order to explain its R&D&I activity to visitors. In the case of LightCoce, through some tools as Roll Up and brochures describing the project.



2nd Plenary Meeting in Nuremberg

On the 14th and 15th of January, the Second Plenary Meeting of LightCoce project has taken place. The event was held at Technische Hochschule Nürnberg (THN) premises in Nuremberg and more than 50 people attended. During the two-day meeting, important issues over the structure of the SEP, pricing policies and business plan have been discussed. Moreover, partners agreed over some technical aspects and future dissemination activities. At the end of the talks, participants had the chance to visit THN laboratories and Pilot Line to see the progress of the project and the activities daily run by the researchers.



Space Tech Expo Europe

On November 19th-20th, our consortium partner Azimut Space GmbH will present LightCoce at the Space Tech Expo Europe, the biggest event about the space industry which takes place every two years. The exhibition will be a great chance to present the project to professionals and firms operating in the aerospace industry.

Welcome to LightCoce partners 4 / 26 - second group



ASHRAE

Founded in 1894 ASHRAE is a global society advancing human well-being through sustainable technology for the built environment. The society's main focus is on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today.

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Axia

Axia Innovation is a consultancy company based in München (DE) specialized in the support of companies in all the phases of their business development and product commercialization. Axia Innovation is mainly focused on four services: Project Management, Innovation Management, Knowledge Transfer, and Communication & Design. Their synergy represents the value proposition of the company targeting business development, coordination and implementation.

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RISE

RISE is Sweden's research institute and innovation partner. Through their international collaboration programmes with industry, academia and the public sector, they ensure the competitiveness of the Swedish business community on an international level and contribute to a sustainable society. Their 2,800 employees engage in and support all types of innovation processes. RISE is an independent, State-owned research institute, which offers unique expertise and over 100 testbeds and demonstration environments for future-proof technologies, products and services..

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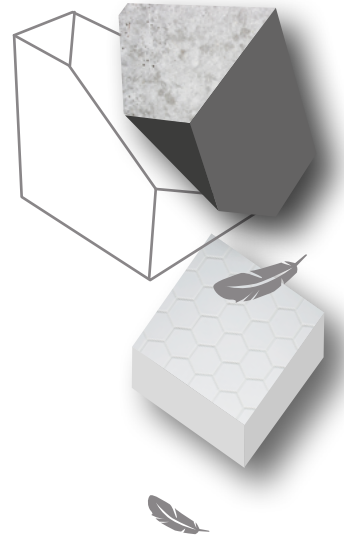
Creative Nano

Creative nano is a startup research and commercialization SME focusing on technological product-based solutions specialized in the field of nanotechnology. Cnano is developing costumer-based solutions in synthesis, processing and manufacturing of nanomaterials, composite nano-coatings, nano-particles, hybrid systems and liquid systems. Cnano develops products that follow properties such as high corrosion resistant, high transparent, water repellant, easy-to-clean, anti-finger-print, abrasion-resistant, high temperature resistance, no delamination and photo catalytic activity.

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Inspiration



**“What’s nice about concrete
is that it looks unfinished.”**

Zaha Hadid

Connect with us!

Are you eager to know more
about the state of the art of lightweight
concrete and ceramics?

Are you a professional or a company
providing services that LightCoce
might need?

Are you an expert in the field
of lightweight materials?

Contact us to share your
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