MatCHMaker
Materials Characterisation & Modelling

NEWSLETTER #4

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Open data and industry-driven environment for materials characterisation and modelling combing physics and data-based approaches

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Content

Spotlight on our Partners: SINTEF (Norway) and TU Wien (Austria)

:

Sigurd Werner (SINTEF, Norway), Research Scientist

Sophie Schmid (TU Wien, Austria), PhD Student

Reducing CO2 Emissions through Sustainable Cement Production

The substitution of clinker with supplementary cementitious materials (SCMs) is crucial in reducing CO2 emissions from cement production. Today, by-products from the steel and coal industries are increasingly incorporated into European cement to achieve this goal. In our first interview, Sigurd Werner, a researcher at SINTEF, shares his insights on the versatility and widespread use of cement, exploring the various methods of production and their environmental benefits.

SINTEF

SINTEF is one of the largest European independent research organisations with international top-level expertise in the fields of technology, the natural sciences, medicine and the social sciences. Carrying out several thousand projects every year, their focus lies on Energy, industry, manufacturing, and ocean space.

Exploring Sustainable Cementitious Materials

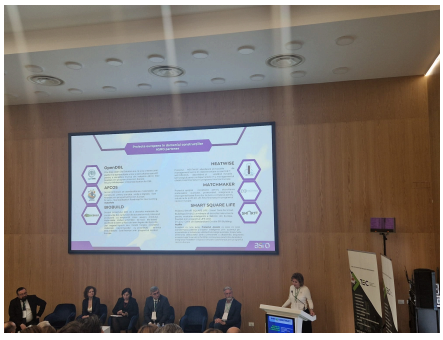
Sophie Schmid, a PhD student at the Institute of Mechanics of Materials and Structures at the, is working to reduce CO2 emissions from cement production. Her research focuses on the microscopic properties of cement pastes and mortars, using innovative materials such as limestone and calcined clay. By modelling the strength of materials, Sophie aims to develop green solutions for construction, from homes to large-scale infrastructure.

TECHNISCHE UNIVERSITÄT WIEN

The TU Wien, founded in 1815 as the first technology-related university within the German-speaking world, is Austria's largest research and educational institution in technology and natural sciences. More than 4,000 scientists are researching "technology for people" in five main areas: Computational Science & Engineering, Quantum Physics & Quantum Technologies, Materials & Matter, Information & Communication Technology, and Energy & Environment. TU Wien is a partner in many research networks, e.g., as one of the Founding Members of the European Materials Modelling Council (EMMC ASBL), an important platform for networking with European and international projects and initiatives.

Event Highlights

The year 2024 was marked by a series of noteworthy occurrences, both within and beyond the project's immediate sphere, that bear mention as highlights.



INNOCONSTRUCT2024
29.-30.05.2024
Website: https://innoconstruct.ro/

The INNCONSTRUCT 2024 event developed into a full-scale summit with over 100 speakers and 14 parallel sessions, including workshops, roundtables, conferences, and a hackathon event. Topics ranged from Building Information Modelling and energy efficiency to innovative technologies and digital twins. With more than 300 participants, the event also marked the first use of the new conference centre at the University of Civil Engineering in Bucharest. Key topics included digitalisation, innovation, human resources, energy efficiency and the circular economy.

Our project partner, ASRO, also attended and gave a presentation on the MatCHMaker project. The conference aimed to foster a lively exchange of ideas, offer solutions to current challenges and promote optimism within the community.

MSE 2024

MSE Congress 2024
Darmstadt, Germany
24.-26.09.2024
Website: https://mse-congress.de/

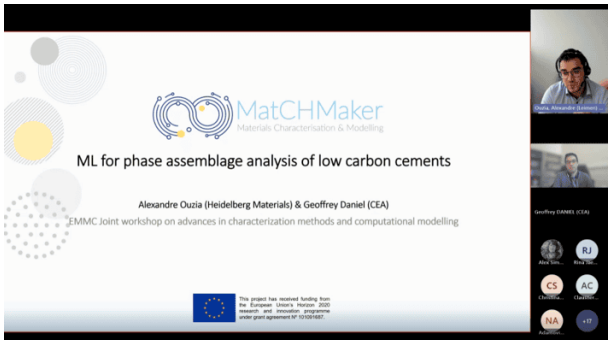
The MSE (Materials Science and Engineering) Congress 2024 was held in Darmstadt. This year's programme included sessions on modelling and simulation, characterisation, digital transformation, circular materials, biomaterials and more. Our partners from Heidelberg Materials and AIMEN attended and showcased the MatCHMaker Project.

Third MatCHMaker General Assembly in Trondheim

The MatCHMaker Project General Assembly was held on October 2nd and 3rd in Trondheim, Norway, hosted by SINTEF. Consortium members from across Europe gathered at the Sverresborg Folk Museum and SINTEF headquarters to review the project's progress at its halfway point. Highlights included presentations from work packages, technical discussions, and a visit to Norwegian Univesity of Science and Technology's (NTNU) state-of-the-art laboratories.

MatCHMaker at the Joint Workshop on Characterisation Methods and Computational Modelling

On October 24th 2024, the MatCHMaker Project and EMMC participated in the inaugural Joint Workshop on Advances in Characterisation Methods and Computational Modelling.

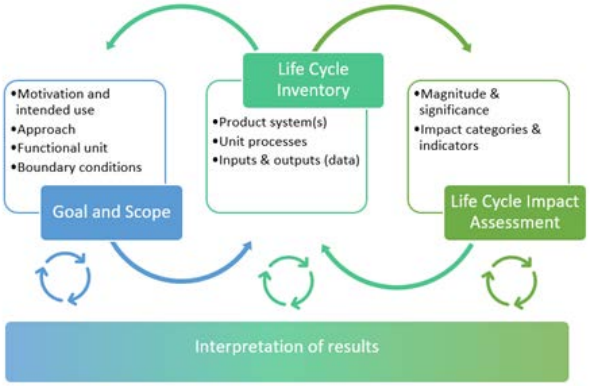


Ludovic Jason (CEA), our project coordinator, opened the event, followed by a presentation from Alexandre Ouzia (Heidelberg Materials) and Geoffrey Daniel (CEA) on a Machine Learning model for phase assemblage analysis of low-carbon cement pastes.

Speakers from sister projects, including AddMorePower Horizon, AID4GRENNEST, D-STANDART, Knowskite-X, and CoBRAIN, showcased innovative approaches to industrial challenges using advanced characterisation and modelling techniques.

Life Cycle Assessment (LCA)

How to assess the sustainability and impacts is a central question of every research project. Within the MatCHMaker project, we apply the established methodologies of Life Cycle Assessment (LCA) and Social Life Cycle Assessment (S-LCA) to evaluate the environmental and social impacts of the products and services the project is working towards. Learn more in our online post!



We are looking for long-term partnerships!

Materials' microstructure is fundamental for our understanding of the material's properties. Quantitative characterisation of microstructures is therefore essential for the optimisation of the performance of materials. Machine learning algorithms are promising for image analysis yet are still scarcely applied in our field. In cement research, e.g., clustering algorithms enabled a better understanding of the kinetics of recycled concrete paste carbonation.
We will continue in this direction and are gathering more data to make our codes more robust and transversal, and are looking for partnerships and synergies going beyond the lifecycle of the project.

If you are part of an EU project or know one interested in expanding an image database, building case studies and algorithms on all classes of materials, please contact us!

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