

ARTIFICIAL INTELLIGENCE

DM629/Transizioni - Artificial Intelligence and Material Science (AI+MS): a New Frontier for the Generation of Innovative and Green Materials

Funded By	UNIVERSITA' DEGLI STUDI DI VERONA [Piva/CF:01541040232] Ministero dell'Università e della Ricerca - MUR [Piva/CF:96446770586]
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Context of the research activity	<p>The goal of the project is to explore, with machine learning (ML) techniques, the possibility of crafting innovative materials which exhibit specific physical and chemical properties. The idea consists in simulating by ML the expected behavior of some mixed ingredients after diverse crafting processes. The project will be focused on natural materials mainly, but not only, with the constraint of starting from waste materials. We will collaborate with the International Marble Institute (ISIM).</p> <p>Progetto finanziato dal PNRR a valere sul DM 629/2024 "Transizioni digitali e ambientali" - CUP: E14D24002240006 Main seat of work: Verona For more information, please contact: Prof. Marco Cristani - marco.cristani@univr.it</p>
	<p>The project aims to establish innovative up cycling processes for transforming waste materials into a valuable resource through artificial intelligence (AI) techniques and technologies. The project will focus on diverse potential applications in the construction and manufacturing industry, framing the creation of new materials as a mathematical optimization process.</p> <p>AI+MS stems from encouraging preliminary research conducted under the European funding program LIFE ZSW, with a specific focus on environmental sustainability. The main scenario considers the upcycling of stone processing sludge into construction materials. In the Verona and Vicenza regions, along with other areas, stone processing sludge is classified as waste and disposed of in landfills for inert materials, with minimal incentives for its</p>

Objectives	<p>recovery. AI+MS seeks to address this issue by generating multiple environmental benefits: Reduced land consumption by minimizing landfill requirements; Mitigated air pollution associated with the extraction and transportation of natural aggregates; Decreased waste disposal in landfills; Conservation of natural resources by reducing the consumption of natural aggregates such as gravel and sand. Other scenarios different from the stone waste could consider glass jars</p> <p>Research Approach The research activities will involve an interdisciplinary approach for the doctoral student, fostering collaboration between the departments of: a) Innovation Engineering for Medicine; b) Biotechnology, at the University of Verona. The project will also involve the International Marble Institute (ISIM), which will provide the most suitable technical and business infrastructures for the research, including experimental facilities and companies in the sector involved in the extraction, processing, and commercialization of natural and recycled aggregates, as well as industry professionals. The project will have a huge echo in many contexts, with some dissemination activities that will target the following stakeholders: i) Government agencies; ii) National and local industry organizations; iii) Investors; Decision-makers; iv) Researchers; Science journalists</p> <p>Expected Outcomes The AI+MS project will have the following outcomes: Establishment of innovative upcycling processes for stone processing sludge (or other waste materials) using AI techniques and technologies. Development of a new sustainable building material with desirable properties. Demonstration of the material's potential applications in various construction scenarios. Quantification of the environmental benefits associated with the project's solutions The research project also includes a 6-month period abroad at the following institution: Institute of Low Temperature and Structure Research - Polish Academy of Sciences Okolna 2, 50-422 Wroclaw - Poland</p>
Skills and competencies for the development of the activity	<p>The ideal skills that the candidate should preferably possess will be that of a bachelor in materials sciences, and at the same time a sufficient mastery of programming and principles of artificial intelligence.</p>