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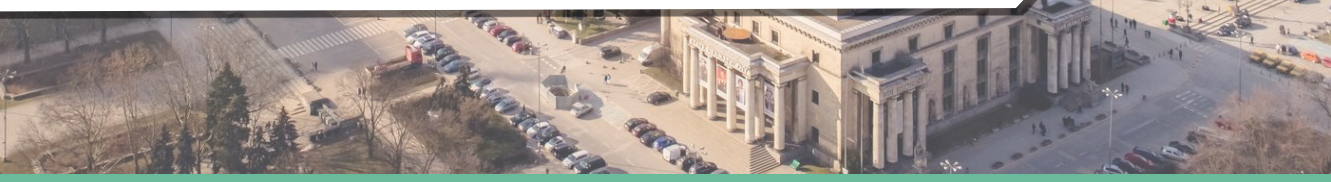
17TH INTERNATIONAL CONGRESS ON POLYMERS IN CONCRETE 2023

Concrete-Polymer Composite in Circular Economy

Book of Abstracts

17th International Congress on Polymers in Concrete ICPIC 2023

Warsaw, Poland, September 17-20th, 2023



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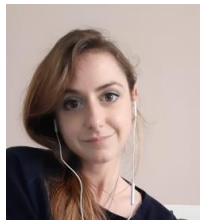
Monday, 18-09-2023

Session 1. CHALLENGES FOR C-PC IN CIRCULAR ECONOMY			
1.	K. J. L. Lee, S. F. Wong	Recycled Mixed Plastic Fine Aggregate in Cement Concrete	11:30 – 11:45
2.	R. Arroyo, S. González-Moreno, L. A. Cuenca-Romero, V. Calderón	Eco-cement cobblestones with polyurethane wastes	11:45 – 12:00
3.	A. Sarcinella, J. L. Barroso de Aguiar, S. Cunha, M. Frigione	Novel sustainable polymer-based Phase Change Materials (PCMs) for mortars based on different binders for the energy efficiency of buildings located in different climatic regions	12:00 – 12:15
4.	V. Calderón, R. Arroyo, C. Alía, L. Garijo, S. González-Moreno	Properties of eco-cement blocks made with polymer wastes and graphene	12:15 – 12:30
5.	S. Cunha, R. Silva, J. Aguiar	Cement mortars with incorporation of foundry industry wastes: physical, mechanical and durability behavior	12:30 – 12:45
6.	J. J. Sokołowska, B. Chmielewska	Carbon Footprint and CO_2 emissions in the Concrete-Polymer Composites Technology	12:45 – 13:00



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Sandra Cunha. She develops academic work as Auxiliary Researcher in the University of Minho, obtaining her PhD in Civil Engineering in the University of Minho in 2018, with a thesis entitled “Development and Characterization of Mortars with Incorporation of Phase Change Materials”. Her research interests are the sustainable construction, construction materials, energy efficiency, phase change materials, composite materials, construction and demolition wastes and foundry industry wastes.

Mariaenrica Frigione. Associate Professor since 2001 at University of Salento, with Academic Qualification of Full Professor since 2014. Leader of the Research Group Materials and Technologies for Construction and Cultural Heritage (MaTech – Ccult Group). From 2013 to 2019: Vice-Rector of University of Salento and Delegate of the Rector for Internationalization. Since 2018 she is the Secretary of ICPIC. She is Permanent Visiting Professor at Brno, University of Technology, Czech Republic.

Novel sustainable polymer-based Phase Change Materials (PCMs) for mortars based on different binders for the energy efficiency located in different climatic regions

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The buildings sector is one of the main contributors to the use and consumption of fossil fuel energy and, consequently, to the CO_2 emissions. This evidence is more widespread in industrialized countries where energy is used for heating and cooling purposes. This trend is not destined to change since climate change affects temperatures making them hotter in summer and colder in winter. A solution to this issue is represented by Phase Change Materials (PCMs) that can absorb, store and release energy according to their physical state that changes with the environmental temperature. In this work, a novel eco-sustainable PCM has been developed through the form-stable method. Through this method, it was possible to create a composite material consisting of a natural matrix (i.e., a very porous stone obtained from processing waste) and an eco-friendly polymer-based PCM, i.e., Poly-Ethylene Glycol (PEG). This composite material has been used to replace mortar aggregates. A complete characterization was performed on the new PCM assessing its thermal stability and thermal efficiency. Mortar formulations based on different binders (i.e., hydraulic lime, and cement) were, then, produced including the composite material as aggregate. The study of the mortar's properties, in their fresh and hardened states, allowed to identify those with suitable mechanical properties. These latter were then subjected to a further investigation to assess their thermal behavior in response to different climatic loads. Encouraging results were achieved that allowed to establish the effectiveness of the novel PCM in thermo-regulating an indoor environment.

Keywords: Phase Change Material (PCM); Poly-Ethylene Glycol (PEG); Mortars; Circular Economy (CE); Energy efficiency.