WARSAW
17-20 SEPTEMBER 2023

ICPIC 2023

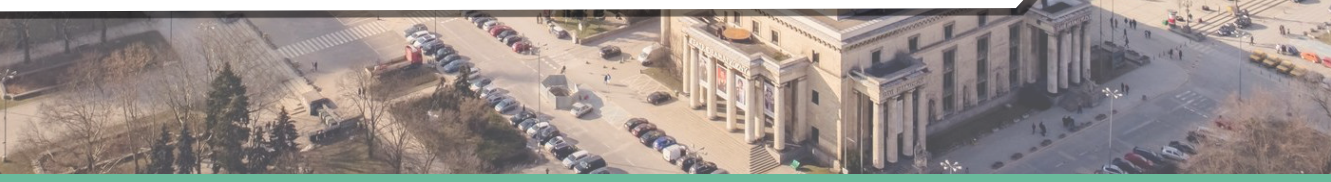
17TH INTERNATIONAL CONGRESS ON POLYMERS IN CONCRETE 2023

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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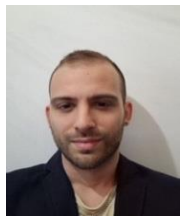
Tuesday, 19-09-2023

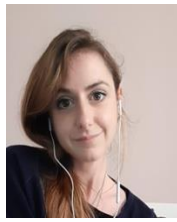
Session 5. IMPROVEMENT OF THE C-PC PROPERTIES			
1.	A. Cwirzeń	KEYNOTE 7: Nanomonitoring of concrete microstructures	15:00 – 15:25
2.	A. Flohr, C. Rohde, S. Devarajamohalla Narayana, A. Osburg	Evaluation of Strength and Modulus of Elasticity of Polymer-modified Cement Concrete (PCC) under Thermal Impact within a Defined Service Temperature Range	15:25 – 15:40
3.	N. Kai, M. Kawakami, M. Kido, K. Ishitsuka, Y. Kuwahara	Current Status of Resin Concrete in Japan	15:40 – 15:55
4.	J. H. Yeon, Y. G. Choi, C. J. Yang, K. S. Yeon	Effect of Polymer Paste Content on the Porosity and Strength of Pervious Polymer Concrete	15:55 – 16:10
5.	H. Yamada, M. Wakasugi, T. Kanda, T. Seki, K. Ichimiya	Basic study on ultra rapid hardening alkali activated material using sodium orthosilicate	16:10 – 16:25
6.	P. G. G. Lascurain, A. Amendola, M. Frigione, A. Sarcinella, L. Toniolo, S. Goidanich	Optimization of Eco-Sustainable, Form-Stable Phase Change Material to be incorporated in Aerial-Lime-Based mortars	16:25 – 16:40

Paulina Guzmán García Lascurain. PhD Candidate in Materials Engineering since 2021, in the department of Chemistry, Materials and Chemical Engineering "Giulio Natta" at Politecnico di Milano (Italy). Her current work devotes to the development of sustainable lime-based mortars with improved properties for the restoration of build heritage.



Alessandro Amendola. Former student of Politecnico di Milano, graduated in Materials engineering and nanotechnology with a thesis named "Optimization of Eco-Sustaiable, Form-Stable Phase Change Material to be incorporated in Aerial-Lime-Based mortars". Today he is working as Operations Engineer at Texno s.r.l. in Novara.

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.



Antonella Sarcinella. Research Assistant since 2022 in the Department of Engineering for Innovation at the University of Salento (Italy), specializing in Material Science and Technology. Her expertise lies in the development of sustainable materials for enhancing energy efficiency in buildings.

Lucia Toniolo. is Full Professor of Material Science and Technology at Politecnico di Milano, and she is member of the School of Architecture Urban Planning Construction Engineering teaching Materials for sustainable built heritage. She is responsible of the scientific Laboratory Materials and Methods for Cultural Heritage, dealing with innovative materials and methods for conservation. Since 2020 she is Chair of the Interim General Assembly of the European Research Infrastructure for Heritage Science (E-RIHS). Since 2016 is appointed Fellow of the International Institute of Conservation (IIC, London, UK).

Sara Goidanich. is assistant professor, and she has a PhD in Materials Engineering. Her research activity is mainly focused on the study of materials and methods for the conservation and non-destructive diagnostic of cultural heritage with special attention to metallic artefacts as statues or architectural surfaces exposed to the atmosphere.

Optimization of Eco-Sustainable, Form-Stable Phase Change Material to be incorporated in Aerial-Lime-Based mortars

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The building sector faces a challenge to find innovative and sustainable ways to increment the energy-efficiency of buildings and reduce their environmental impact. Recently, the incorporation of phase change material (PCM), based on a polymeric active phase (PEG-1000) in waste stone aggregates, has proven to be a promising option to be used for building restoration. Mortars that include PCM aggregates demonstrated to have favorable thermal properties, that would lead to a reduction of energy requirement for heating/cooling needs. However, the inclusion of aggregates impregnated by PEG causes a reduction in the mechanical properties of the mortars possibly due to (i) a lack of compatibility between aggregate and binder, or (ii) a problem with the confinement of the PEG, causing its dispersion in the mortar. Therefore, the aim of this study was to investigate the causes associated to the reduction of the mechanical properties and propose a method to prevent it. Preliminary results showed that, given its high water solubility, the PEG 1000 included in the stone aggregates tends to be washed away when these aggregates are incorporated in the mortar mixture. This hypothesis was confirmed by FTIR spectroscopy. Therefore, an additional confinement method using a layer to coat the stone aggregates impregnated by PEG 1000 was proposed in this study. Different materials were tested as coating layer: powder calcium hydroxide, milk of lime (suspension of Ca(OH)2 in water), pozzolana, and cocciopesto. Carbonated mortar samples using the proposed coated aggregates were, then, analyzed using FTIR to evaluate the efficiency of this encapsulation methodology. Preliminary results suggested a relevant improvement in terms of PEG confinement.

Keywords: Phase Change Materials (PCMs), Lime-based mortars, Thermal energy storage (TES), Circular economy.