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ABSTRACT BOOK

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Introduction

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How to Use the Abstract Book

Refer to the Table of Contents to determine page numbers on which specific session abstracts begin. At the beginning of each session are headings that list session title, location and session chair. Starting times for presentations and paper numbers precede each paper title. The Author Index lists each author and the page number on which their abstract can be found.

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characteristics were evaluated using experimental protocols forming calcium carbonate. Urease production was evaluated via colorimetric methods and solidified carbonate was observed. The isolated species HK-1 was applied to the cracked concrete and observed for 90 days. As a result, the gap between cracks was solidified and filled with white materials. The isolated strain is expected to help reduce the maintenance cost of the building materials and allow them to be used for a more extended period, thus helping to respond to carbon neutrality positively.

(ICACC-P042-2023) Effect of curing temperature on the resilience of marginal excavation, construction and demolition waste mixed with hydraulic cement

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Using marginal demolition and construction residues in the form of excavation clays and tailings, the aim of this research is to determine the relationship between the curing temperature and the resilience of a soil formulation combined with hydraulic cement. The resilient modulus (AASHTO T307-99) of cylinders was measured in three clayey tailings mixed with cement, cured at different controlled temperatures: 10°C, 25°C and 40°C. We then correlate the effect of curing temperature on the resilience of the materials. Likewise, the aim is to identify variables that affect the results such as plasticity, thermal conductivity, fatigue, compressive strength and indirect tensile strength at 7 days of age.

(ICACC-P043-2023) Addition Effect of Recycled Concrete on Permeable Concrete

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This paper investigates the physical and mechanical properties of pervious concrete using shrinkage and demolition waste, more specifically concrete block waste, as coarse aggregate. The mechanical performance and permeability of pervious concrete are shown with respect to the volume fraction of recycled and natural aggregate used in each sample, the aggregate particle size, the aggregate to cement ratio, and the water to cement ratio. The replacement percentages of recycled aggregate volume used were: 0%, 50% and 100%. The two nominal maximum diameters used were 9.5mm and 12.7mm, and the two water-cement ratios used were: 0.28 and 0.34. The characterization of the aggregates as well as the proportions of the mixes was conducted in properties such as workability, void content, unit weight, compressive strength, and permeability. Results show very low strengths and very high permeabilities, confirming that mechanical strength decreases with increasing permeability.

(ICACC-P044-2023) Influence of Weathered Polyethylene Terephthalate on Performance of Cement-polymer Composites

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In terms of material-based problems, circular economy-based solutions are a near requirement. This is especially true for two very broadly used, manmade material categories: Portland cement-based concrete; and plastic waste. To date, infrastructure material scientists have had ample success with the utilization of waste plastic in Portland cement-based construction materials (e.g., concrete, mortars, etc.). However, limited research has been conducted on waste plastic as a cement additive. Therefore, this work has sought to understand the role that crystallinity (i.e., weathering) of waste polyethylene terephthalate (PET) has on the resulting mechanical performance of the cement matrix when waste PET is utilized as a cement additive. Waste PET was modified via: artificial weathering using the one-of-a-kind NIST SPHERE; and micronization using cryogenic grinding. At each modification step, the structures of various waste PET were characterized via differential scanning calorimetry and Fourier-transform infrared spectroscopy. After grinding, particle characterization was performed. Lastly, compression testing was used to evaluate the effect of PET inclusion in the cement-polymer composite matrix. Overall, the results of this work will help to provide the broader construction materials community an indication on the viability of waste plastic, specifically PET, as a cement additive.

(ICACC-P045-2023) Effect of WC on the Microstructure and Properties of Zirconium Diboride

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Tungsten carbide (WC) additions, up to 5 wt%, were added to commercial zirconium diboride (ZrB_2) powder. Densification was promoted by the addition of 0.5 wt% carbon. The powders with WC additions were hot-pressed at 2150°C with a pressure of 32 MPa. Bulk densities were measured by the Archimedes method. Scanning electron microscopy was used to determine grain size and morphology, as well as whether any second phases were present. The crystalline phases present were determined by x-ray diffraction. Properties, including hardness, elastic modulus, strength, and thermal conductivity, were measured and will be discussed.

(ICACC-P046-2023) Comparison of Oxidation Behavior of C_f / MC-SiC (with M = Hf, Zr) Composites in an Oxyacetylene Torch and in an Arc Plasma Torch

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The rapid development of space vehicles needs the elaboration of a new kind of materials able to resist to extreme conditions. For thermal-structural materials, the most severe conditions take place in atmospheric reentry vehicles and/or combustion chambers. Those two environments lead to the occurence of several physical and chemical reactions due to the high temperature, high flux and oxidation phenomena. One of the best candidates is the Ceramic Matrix Composites (CMC) especially CMC with Ultra High Temperature Ceramic (UHTC) as matrix. This kind of materials presents many advantages. The melting temperature of UHTC like TaC, HfB_2, HfC or ZrC is above 2500 °C. Moreover, they exhibit high hardness, and good ablation resistance. In this study, C_f / HfC – SiC and C_f / ZrC – SiC composites are elaborated by Reactive Melt Infiltration (RMI) process using hafnium and zirconium silicide (HfSi2 and ZrSi2). Samples are exposed to severe conditions using an Oxyacetylene Torch and an Arc Plasma Torch. Temperatures higher than 2000°C are reached. Post-mortem microstructural analysis (Electron Probe Micro Analysis and SEM/EDS) allows to compare sample degradation and to understand oxidation mechanisms.

(ICACC-P047-2023) Enhanced high temperature stability of UHTC modified C_f/SiC composite fabricated by liquid silicon infiltration

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Ultra-High Temperature Ceramic (UHTC) is a promising refractory material for aerospace fields such as hypersonic vehicle and weapons. The UHTC exhibits high performance against oxidation and ablation due to its high melting temperature. The carbide and boride ceramics and their composites are well-known as UHTC and