PARTNERS

RECS

University of Cyprus

University of Brighton

BAM CONCEPT

The BAM project work plan consists of five (5) distinct Work Packages, implementing activities like material design and development, production and validation in laboratory environment and through an analytical method, management, exploitation and dissemination, and techno-economic analysis.

- WP1: Project Management
- WP2: Dissemination and Exploitation Activities
- WP3: Design of Materials
- WP4: Manufacturing and Validation of the Designed Materials
- WP5: Technoeconomic Evaluation and Cost-Benefit Analysis

IMPACT

The implementation of the BAM project is expected to drive innovation in building materials towards more knowledge-based products, benefiting the local and European research community by enhancing competitiveness. The project aims to meet the increasing demand for competitive materials, unlocking scientific and technological capacities for more efficient products. Developing materials with dual behavior, while reducing environmental impacts, aligns with European environmental and societal progress. Additionally, integrating 3D printing into material development, alongside plastics and electronics, will boost scientific and technological interest, particularly in Cyprus. Lastly, the use of geopolymerisation technology promises significant environmental, economic, and social benefits, offering a low-cost, environmentally friendly alternative to traditional cement production.

The project (Blast and Fire Resistant Material, Contract Number: EXCELLENCE/0421/0137) is implemented under the programme of social cohesion "THALIA 2021-2027" co-funded by the European Union, through Research and Innovation Foundation.

Co-funded by the European Union

Republic of Cyprus

RESEARCH & INNOVATION FOUNDATION

Blast and Fire resistant material

THE BAM PROJECT

Over the last decade, the construction works are ongoing, however only in the recent years the safety of such infrastructures has gained increasing attention, particularly the issues of fire, blast and impact.

This transformation in the mentality is attributed to a series of large fires and blast incidents (e.g. terrorism attacks) that have taken place in the last years, which have been responsible for dramatic incidents, which led to human casualties, major structural damages and serious consequences for the regional economies. The existing materials either cannot offer protection against both circumstances or their cost is unaffordable.

The BAM project addresses these challenges, targeting to the design, development and validation of two new building materials, which will offer the appropriate resistance against blast, impact and fire, according to the relevant standards, considering that currently there is no such material that can offer both services.

OBJECTIVES

The BAM project addresses these challenges, targeting to the development of 2 new, innovative and smart building materials, which will offer the appropriate resistance against both impact, blast and fire, and will be manufactured with 2 different methods, i.e.: i) with the conventional precast method and ii) with 3D printing manufacturing. Therefore, the Scientific Objectives (SO) of the BAM project focusing on the design, development and validation of:

- Hybrid Laminated Material with combined resistance to blast, impact and fire
- Smart Composite Geopolymeric Concrete with simultaneous resistance to blast, impact and fire.

Both materials will be resistant to fire withstanding temperatures which are met in building applications, i.e. up to 1050 °C shown in ISO-834 fire curve.

In addition, the materials will be resistant to explosive load equal to 3.5 kg, which simulates a typical building explosion and impact loads, validated through drop hammer tests (i.e. 20 kg hammer from 4 m drop-height). The performance of both materials will be measured and quantified by applying existing standard tests and analytical methods.

Utilizing geopolymerisation for material development, eco-friendly with diverse applications. Additionally, 3D printing enables faster, easier manufacturing with reduced waste. It offers customization in building, challenging conventional methods.

HOST ORGANIZATION

FREDERICK RESEARCH CENTER