

DEVELOPMENT OF ECO-FRIENDLY COMPOSITE MATERIALS BASED ON GEOPOLYMER MATRIX AND REINFORCED WITH WASTE FIBRES

Goal of the project

The project is an answer for a specific challenge regarding waste management, recycling and urban mining. The goal of the project is to prepare a broad spectra of advanced and progressive new composite materials based geopolymer matrices and reinforced with natural waste fibres. The application of these new materials will be the construction industry with a high potential of commercial utilization and potential replacement of conventional materials.

Short description of the project

This project deals with the development of new composite materials for construction industry, based on waste products.

Project implemented by:

Project coordinator: Cracow University of Technology.

Partners: Nigde University Turkey, Pontificia Universidad Católica del Peru, Riga Technical University Latvia, Babeş-Bolyai University, Catholic University of Uruguay Damas Antonio Larrañaga, Politehnica University Timișoara.

Implementation period

02/01/2017 – 31/12/2019

Main activities

- WP1. The selection of waste materials for hydrothermal alkalization and therefore to be turned into new materials based on geopolymer matrix for construction applications
- WP2. The selection of waste materials (natural fibres) as a fillers and therefore turned into new composites for construction application
- WP3. Optimization of properties using computer methods for the new materials and structural elements
- WP4. The research into the application of new materials – comparison of the functional properties of the materials
- WP5. Analysis of practical applications of new materials for construction application and testing prototype components in laboratory as well as validated it in relevant environment

Results

The year 2017 had deadlines for the first two Work Packages. WP1, coordinated by Nigde University, dealt with the identification of waste materials for the composite material matrices. Each participating partner performed a survey of possible waste material candidates available in their region (recycled clay bricks and volcanic ash in Peru, fly ash in Turkey, Argentina and Romania, paper mill sludge and rice husk ash in Uruguay and granulated rubber from waste tyres in Poland).

WP2, coordinated by Babeş-Bolyai University, dealt with the identification of waste natural fibres as reinforcements for the composites. As with WP1, each participating partner proposed waste materials available in their region (mostly hemp and flax fibres).

Applicability and transferability of the results:

The new composite materials that will be developed in this project will be tested and their properties compared with conventional construction materials. If the mechanical and thermal behaviour is comparable between the two categories, the newly developed materials will be proposed for replacing traditional materials in each specific region where the waste products are available.

Financed through/by

Horizon 2020 - ERA Net Latin America and Caribbean Countries/UEFISCDI

Research Center

Ștefan Nădășan Laboratory

Research team

Eng. Dan-Andrei ȘERBAN, PhD – Project manager
Prof. Eng. Liviu MARȘAVINA, PhD
Eng. Radu NEGRU, PhD
Eng. Emanoil LINUL, PhD

Contact information

Eng. Dan-Andrei ȘERBAN, PhD
Faculty of Mechanical Engineering
Department of Mechanics and Strength of Materials,
Address: Mihai Viteazu Str., No. 1 Postal Code 300222, Timisoara
Phone: (+40) 256 403 741
E-mail: dan.serban@upt.ro