

Expression of interest for research cooperation

Description of institution

Interested institution:	Cracow University of Technology
Department carrying out the proposed research	Chair of Building Materials Engineering Institute of Building Materials and Structures Faculty of Civil Engineering
Address and webpage	Warszawska 24, 31-155 Kraków, Poland http://www.l-11.pk.edu.pl
Contact person (name, e-mail address, phone)	Izabela HAGER, ihager@pk.edu.pl , phone: +48 126282367

Research offer

Brief description of the department (key research facilities, infrastructure, equipment)

(up to 1000 characters)

Chair of Building Materials Engineering is concerned with research in topics regarding wide range of building materials, mainly cementitious materials. New materials are developed for special applications and the properties of existing materials are optimized for the requirements. Our unit have well-equipped laboratories, including infrastructure for composite materials development, mechanical and physical properties testing and performances evaluation, material structure observations (*SEM and optic microscope, EDS, mercury porosimetry, helium pycnometer*), material transport properties evaluation (*Cembureau and Torrent permeability, chlorine ion diffusion, etc.*), durability testing in variable environmental conditions (*freeze-thaw chambers, high temperature furnaces, weathering chambers*). Our Chair is also involved in quality control of building products and properties assessment. We have a wide experience in onsite material properties evaluation with NDT and destructive techniques.

Scientific area

<input type="checkbox"/> Chemistry	<input type="checkbox"/> Social Sciences and Humanities
<input type="checkbox"/> Economic Sciences	<input checked="" type="checkbox"/> Information Science and Engineering
<input type="checkbox"/> Environment and Geosciences	<input type="checkbox"/> Life Sciences
<input type="checkbox"/> Mathematics	<input type="checkbox"/> Physics

Research field

(up to 500 characters)

Research topics are mainly connected with development new generation sustainable building materials that reduces CO₂ emission (pozzolan additives and alternative to Portland cement binders i.e. silicate generated as a by-product of industry) as well as design, technology, execution and modification of special application concretes. Our research also investigates the use of alternative to natural aggregates for concretes recycled concrete aggregates and lightweight aggregates. The research is also carried out on issues concerning the durability of building materials, and the physical and chemical processes linked to their destruction.

The proposed research/project description

(up to 1000 characters)

Our research is oriented towards:

- development of new sustainable building materials and building products with low energy and environmental impact contributing to lower CO₂ emission;
- circular design of building products that facilitate product reuse, recycling;
- design and quality control of different types of mineral composites and new generation concretes (high performance concrete, reactive powder concrete, self compacting concrete, fiber reinforced concrete, new lightweight aggregate concrete) as well as geopolymer concrete and soil-cement composites;
- design of mineral composite materials with improved durability and performances in harsh environments and protection systems with organic coatings;
- research on the influence of material and technological factors affecting durability of mineral and organic materials;
- testing of materials in historical buildings and the assessment of material damage in contemporary structures using destructive and non-destructive methods;
- development of less energy demanding and new technologies of material production that will help to decarbonise industrial processes (i.e. 3D printing).

Additional information (key Persons and Expertise; additional trainings, research programme, other)

Key Persons:

Izabela Hager, Lucyna Domagała, Tomasz Zdeb, Tomasz Tracz

Recent projects:

2017-19 NCN, 2016/23/N/ST8/01155 Influence of restraint of thermal strains on characteristic of concrete spalling in fire

2016-18 POIR, 04.01.04-00-005715 Technology of fiber reinforced soil-concrete walls for implementation as a construction of excavation support structures

2011-14 NCN, N N506 045040 Multiparameter diagnosis of condition of cement concretes subjected to fire

2010-13 NCN, N N506 072138 Influence of composition and volume fraction of cement paste and

mortar in ordinary concretes and high performance concretes on its gas permeability
2007-2009 KBN, R04 002 02 Concrete composite with ultra high strength matrix, project coordinated by Institute of Ceramics and Building Materials
2007-2009 KBN, R04 013 01 Concretes with cements containing fly ash from fluidized bed furnaces.

Main staff competences and expertise: RILEM Members, EU expert evaluating applications in H2020 (LEIT, NMBP), reviewers for JCR journals, expertise with teaching, communication and dissemination, conference and workshops organization.

Recent proposal submissions: H2020 MSCA-ITN-2017 SUSCONMAT - Sustainable construction materials and eco design of innovative building products (coordinator); POLONIUM: DuraCO₂ - Durable Concrete (coordinator); H2020 NMP-21-2014 MUNAST (partner), H2020-LCE-2015-3 CABLE-SYS (partner)