Search for a Spanish Partner for a Bilateral R&D Project

Organization	
Date of Request:	28 Feb. 2024
Institute Name:	National Research Center
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SECTION 1: Entity launching the partner search *(Please give brief / to the point explanations. For more explanation on any point below, you may add a short paragraph as an annexure, with this document.)*	
Sector	Scientific Research: Energy efficiency of residential and commercial buildings
Entity mission or core functions	low energy-sulphoaluminate cement
Date of establishment	1956
Ownership (if public and traded, add stock exchange and ticker symbol)	Our research team members are affiliated to the Research Institute of Technology of Advanced Materials and raw materials, National Research center of Egypt. www.nrc.sci.eg
Total number of employees	6580
Number of employees in R&D	4250
Key products sold or services provided	We have 14 scientific institute under the umbrella of the National Research Center
Entity core technical competences	Material Sciences and building materials research
Key R&D programs and activities	Manufacturing, characterization, and applications of the geopolymers, glass, glass-ceramics and refinery materials
Examples of accomplishments	We have tens of patents and hundreds of published literature in the field of glass, glass-ceramics, geopolymers, and green building materials
Company strategic orientation	Manufacturing and characterization of green

	building materials

SECTION 2: Spanish Company Profile *(Please provide a brief summary of the prospective partner company or organization. This summary may address some or all of the points below)*	
Profile of ideal technology partner	Manufacturing the low energy-sulphoaluminate cement
Core technological competencies and expertise	Manufacturing and characterizing the sulphoaluminate cement on a large industrial scale.
Other essential qualifications (e.g.: ownership, track records etc.)	Having R and D sector and to be interested in conducting research on the proposed point using natural raw materials
If you have a list of companies with whom you are in contact or interested in contacting, please provide contact details	N/A
If you are interested in collaboration: please specify details and other important information you want to share with a potential company	I would like to exchange the experience with the Spanish Company and to cooperate with our group in characterizing the prepared sulphoaluminate cement and to start manufacturing on a large industrial scale, I mean to accept using their facilities to test and manufacturing the prepared materials on industrial economic scale.
Interested areas of collaboration	manufacturing the low energy-sulphoaluminate cement
Specific R&D contribution you are seeking/offering	Please check the attached abstract

Abstract

Utilizing some raw materials for preparing and characterizing a low energy-sulphoaluminate cement for sustainable development purposes

Bassem S Nabawy

The Ordinary Portland Cement (OPC) has been widely used as a binder material for the concrete in all over the world, but unfortunately, the OPC cement manufacture produces approximately 5% of the global anthropogenic CO_2 emissions. Therefore, the cement industry is making powerful attempts to diminish emitted the CO_2 in two main trends: 1) Improving the production process to evolution a low CO_2 cement by using mixing it with a Supplementary Cementitious Materials (SCM), e.g., Belite-calcium-sulphoaluminate-Ferrite cements (BCSAF) or Calcium Sulphoaluminate cements (CSA). These supplementary materials are prospective alternative green cementitious binder for the OPC cements. The production of calcium sulphoaluminate clinkers produces lower embodied energy and CO_2 emissions than the Ordinary Portland Clinker, because they require less limestone, lower grinding energy and lower clinkering temperatures than the OPC clinker. Ye'elimite $Ca_4.(AlO_2)_6.SO_4$ is a remarkable component in BCSAF and CSA cements. 2) Significant reduction of the CO_2 emissions that could increase the content of minor elements such as alkali, phosphor and heavy metals, in particular the iron. The CSA is fabricated using a similar procedure to the Portland cement, except that the applied temperature is lower (~ 1250°C), and the clinker is easier to grind.

Therefore, the objective of this study is to manufacture CSFAB cement using raw materials as main components. This will be achieved by manufacturing high ferrite cements using alternative calcium, alumina and iron raw sources, e.g., fatty clay, kaolin, gypsum, and a minimum amount of limestone. X-ray diffraction (XRD), X-ray fluorescence (XRF), thermogravimetric analysis (TGA), fourier transform infrared spectrums (FTIR), and scanning electron microscopy (SEM) will be used to study the hydration phases of the prepared patches. The hydrated CSFAB specimens will be fired at 1225°C, 1250°C and 1275°C and cured for 1, 3, 7, 14, and 28 days; then their mechanical, porosity and bulk density properties will be measured. Finally, the optimum clinker composition will be selected for further testing and calculating the saved energy.

Bassem

Signature

Name: Bassem S Nabawy

Date: 28 Feb 2024