Technology Offer

Use of silica nanoparticles for transforming municipal solid waste incineration (MSWI) fly ash into composite filler

Summary

A Singapore educational and research institution has developed a practical, scalable, low energy-consumption and economically viable solution to process the municipal solid waste incineration (MSWI) fly ash and integrated with the incineration site to minimise production costs. The institution is seeking license agreement or research cooperation agreement with industrial SMEs of all sizes or MNEs.

Creation Date	09 June 2017
Last Update	19 June 2017
Expiration Date	19 June 2018
Reference	TOSG20170609001

Details

Description

In order to convert MSWI fly ash into useful materials, the toxic heavy metals in the ash have to be removed or stabilised. The current technologies such as electrochemical, sintering and vitrification have many limitations, i.e. high cost, high-energy consumption and the generation of more waste.

The technology developed by the institution features a practical, scalable, low energy-consumption and economically viable solution to process the MSWI fly ash in a way that binds and immobilises toxic heavy metals that are present in the ash. The process is based on the use of novel silica nanoparticles which have high surface areas and medium-sized pores. The process can be scaled up and integrated with the incineration site.

The process utilises a continuous stirred-tank reactor (CSTR) that is able to treat about 10 kg/day of municipal solid waste incineration (MSWI) fly ash. The CSTR setup is scalable, has a small footprint and is integrated with water recycling process in the reactor to allow water reclamation for subsequent stabilisation reactions. In general, the CSTR system consists of four major systems:

(i) feed preparation;
(ii) a reactor made of borosilicate glass with temperature and pH control systems;
(iii) a salt recovery system which consists of evaporator-crystalliser, condenser and water recycling system, and;
(iv) two vacuum filtration systems for collection of stabilised incineration fly ash and salts, respectively.

The process utilises specialised silica nanoparticles and is expected to increase the entrapment efficiency of heavy metals by 20-30% as compared to competing processes which reduces the amount of silica needed. The treated fly ash is expected to comply with European Standards, EN12457-2 and NEN7375. The commercial viability of the system has been demonstrated by incorporating the treated fly ash into polymer-matrix composite products.

The institution seeks R&D and licensing partnerships with industry players (SMEs of all sizes or MNEs) with an interest to use this technology for product development.

Advantages and Innovations

This technology is able to integrate with waste-to-energy plants to utilise the MSWI fly ash generated directly for reuse. Companies producing composite materials would also be able to utilise this renewable material for their production for high-quality composites. These composites have a wide application in aerospace, automobile, marine, wind power, infrastructure and sports equipment. Thus, this technology will not only reduce disposal cost but instead generate revenue from waste.

Benefits:
- Offers a cost-effective process to produce higher value-added products from waste, which has a wide variety of applications
- Reduces the disposal cost
- Creates revenue from waste
- Utilises high surface area and tailor designed medium-sized of colloidal silica nanoparticles for better efficiency
- The chemical stabilisation process of solid waste is highly scalable

Stage of Development

Under development/lab tested

IPR Status

Patent(s) applied for but not yet granted

Profile Origin

Other

Keywords

Technology

02002002	Coatings
02007005	Composite materials
02007024	Nanomaterials

Market

08001023	Other chemicals and materials (not elsewhere classified)

NACE

C.32.9.9	Other manufacturing n.e.c.
E.38.2.1	Treatment and disposal of non-hazardous waste
E.39.0.0	Remediation activities and other waste management services

Open for EOI : Yes

Dissemination

Send to Sector Group

Materials

Client

Type and Size of Organisation Behind the Profile

University

Year Established

0

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English

Client Country

Singapore

Partner Sought

Type and Role of Partner Sought

The institution seeks to work with SMEs of all sizes or MNEs in a licensing or research cooperation agreement partnership.

The partner sought could be an industry player from the sectors such as, but not limited to manufacturing, materials, wastes management who is keen to explore the following types of partnerships:

i) Licensing agreement:
The partner can license the technology to further develop and commercialise it to offer to their customers.

ii) Research cooperation agreement:
The partner undertake joint R&D with the Singapore company to develop the technology further into new products that can cater to specific market needs or customer segments.

Type and Size of Partner Sought

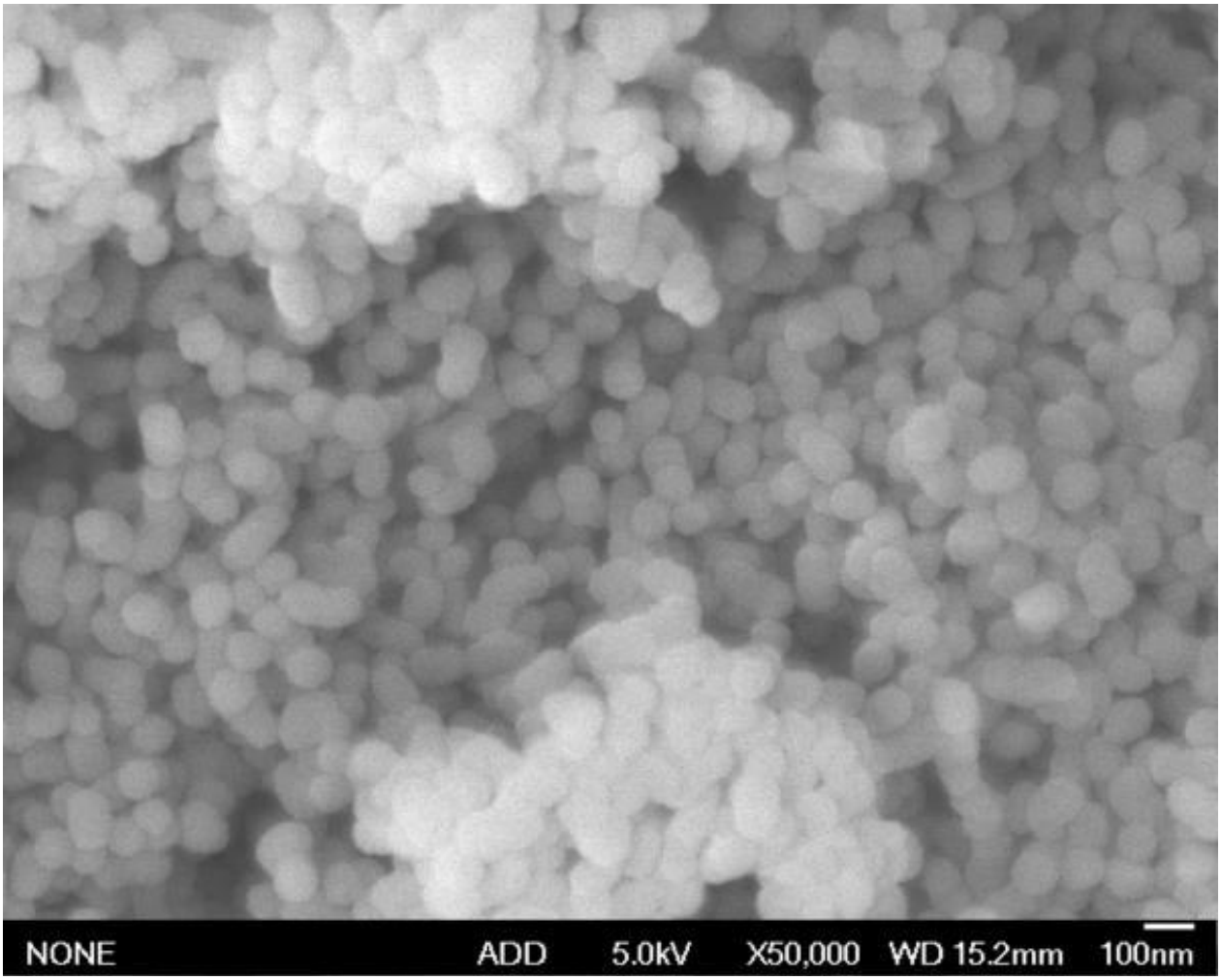
SME 11-50,SME <10,>500 MNE,251-500,SME 51-250,>500

Type of Partnership Considered

License agreement
Research cooperation agreement

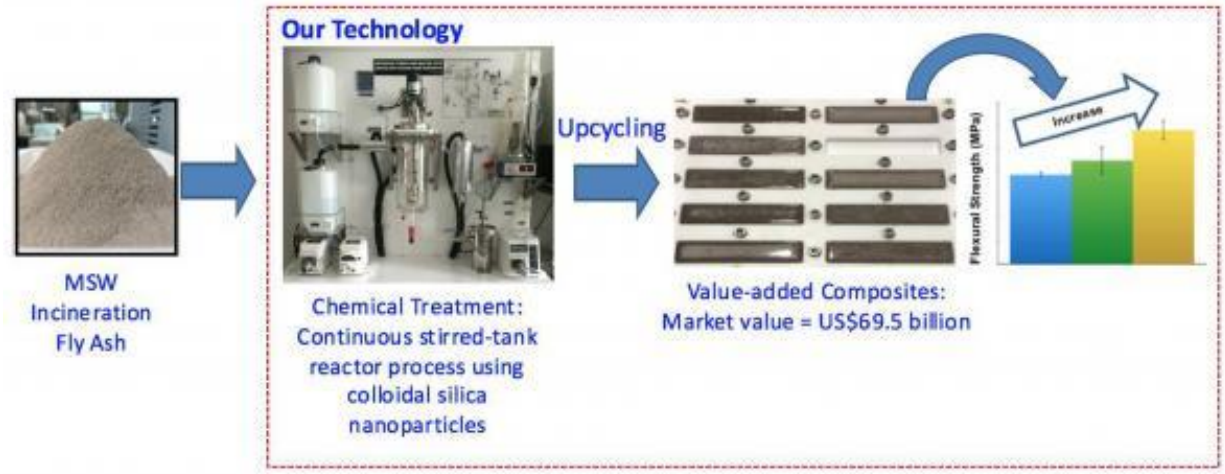
Attachments

MSWI2.jpg



MSWI1.jpg

Partnering Opportunity



Technology Offer

The Slovak company active in the area of galvanizing and bending of metal materials offers their innovative processing services

Summary

The Slovak experienced manufacturer of handmade metal utility and decorative products for gardens and households is looking for potential business partners from abroad. The company is offering specific services and know-how in the area of bending and galvanizing different types of metal materials. The company is interested to make a new long-term partnership in the form of manufacturing or services agreement.

Creation Date	21 January 2016
Last Update	24 April 2017
Expiration Date	09 August 2017
Reference	TOSK20160121001

Details

Description

The Slovak company founded in 1953 is a manufacturer of the unique handmade metal products with the specific method of production giving products long life warranty. The company was established by craftsmen, blacksmiths and carpenters.

The company deals with pressing and bending of metal sheets with thickness dimensions of 0.4, 0.5 and 0.6 mm and with cutting off from these metal sheets up to a thickness of 1.6 mm too. On one of the laser-fibre machines, company heats the treating metal plates up to 6 mm, black galvanized aluminium and brass as well. The company has got its own firing zinc place where the melted zinc is applied on products. Whole process is performed handmade. The company welds on automated robots, but also has got hydraulic scissors and bridge saws. Other type of service offered is dividing of metal sheets. The Slovak company has got its own powder coating paint shop with the size of 1.5 x 1 meter.

The company is interested to conclude manufacturing or services agreement with the European companies from the following areas of activity: machining, forming, surface treatment and similar sectors.

Advantages and Innovations

The company´s portfolio includes around 300 different products signifying a high degree of variability in metal materials processing. Whole production is handmade. Its products have been placed on markets in France, Italy, Japan, Germany, the United States and Great Britain. For instance, on the British market it supplies products to the Buckingham Palace. The company has its own showroom and was nominated for the award “Employer of the Year 2015” in the Slovak Republic.

Stage of Development

Already on the market

IPR Status

Exclusive Rights

Profile Origin

Private (in-house) research

Keywords

Technology

02002005	Forming (rolling, forging, pressing, drawing)
02002010	Machining (turning, drilling, moulding, planing, cutting)
02002015	Surface treatment (painting, galvano, polishing, CVD, ..)
02007010	Metals and Alloys

Market

08003001	Machine tools, other metal working equipment (excl. numeric control)

NACE

C.25.5.0	Forging, pressing, stamping and roll-forming of metal; powder metallurgy
C.25.6.1	Treatment and coating of metals
C.25.6.2	Machining

Open for EOI : Yes

Dissemination

Send to Sector Group

Materials

Restrict Dissemination to Specific Countries

Austria, CzechRepublic, France, Germany, Hungary, Italy, Netherlands, Poland, Sweden,

Client

Type and Size of Organisation Behind the Profile

Industry SME 50-249

Year Established

1953

Turnover

1 - 10M

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English
German
Russian
French
Czech

Client Country

Slovakia

Partner Sought

Type and Role of Partner Sought

The Slovak company is looking for companies active in the area of processing metal materials for manufacturing and services agreement. Potential business partners should be interested to finish their metal materials in the final stage of manufacturing process using innovative methods of galvanizing and bending these types of materials.

Type and Size of Partner Sought

SME 11-50,SME <10,SME 51-250

Type of Partnership Considered

Services agreement
Manufacturing agreement

Attachments

4.jpg



2.jpg



3.jpg



5.jpg



1.jpg



Use of advanced concretes with improved performance properties for construction projects and blue growth applications

Summary

A Spanish SME expert in special concretes provides integral service in projects that require advanced concretes, designing and selecting the most appropriate according to required performance. They seek partners from civil engineering, construction, industrial and blue-growth sectors for a technical or research collaboration. The goal is to explore new sectors where very-high and ultra-high-performance fiber-reinforced concretes (VHPFRC & UHPFRC) advantages add value to clients and stakeholders.

Creation Date	31 May 2016
Last Update	19 June 2017
Expiration Date	10 December 2017
Reference	TOES20160531001

Details

Description

Special concretes are increasingly being used in the last years. They can provide significant advantages in costs, times and workforce in almost every project. However, the most relevant key factor for success is the expertise of the team responsible for the design and implementation of the project.

A Spanish company, born from the result of seven years of research on the field of very-high and ultra-high-performance fiber-reinforced concretes (VHPFRC & UHPFRC), in the last three years has designed, calculated and provided technical assistance for the development of the first three UHPFRC footbridges in Spain. These structures count with improved designs, very reduced maintenance requirements and similar costs than steel-made or concrete alternatives.

The Spanish engineering firm is then specialized in UHPFRC, self-compacting concretes, fiber reinforced concretes, and other special materials. With a strong R&D component, they provide an integral service in projects that include special concretes: material cost and properties optimization, calculations, elements redesign, technical assistance during the precasting, and control during and after the construction.

Furthermore they use the advanced concretes for much more than this: blue growth applications, panel housing, urban furniture, easy-driving sheetpiles… Wherever steel and concrete are two possible solutions, the advanced concretes can provide a more cost-effective solution. At the moment, all the innovations integrated have been demonstrated to be cost-efficient, satisfying both clients and users.

The company counts with two PhD Civil Engineers, two Civil Engineers, and a team of technical experts who are willing to integrate advanced material technologies in different sectors. The group is highly skilled in the field of advanced materials, precast concrete elements, project management, and business strategy. These strengths are combined to add value in very different projects such as: :

• Optimization of a precast concrete elements to reduce costs or improve performance
• Technical assistance for the use of in-situ special concretes in civil engineering applications
• Integration of advanced materials in a structure to minimize resources, transport and costs
• Disruptive applications in non-construction sectors, as aquaculture, industry or urban furniture
• Integration of Building Information Modelling (BIM) in the projects developed

The company is interested in being contacted by potential partners from the construction sectors (footbridges, blue growth, urbanism, civil engineering) in order to develop technical or research cooperation agreements for new applications where the performance of advanced concretes can be exploited.

Moreover the company is also open to receive opportunities of collaboration in research projects to carry out the development of new materials with new properties and applications, mainly addressed to the blue growth. A research cooperation agreement will be established in this case.
The company has recently been granted to implement 2nd Phase SME Instrument.

Advantages and Innovations

The design is much slenderer. The aesthetics, colors and surface finishing are markedly improved. The referred advanced concretes can extremely reduce the resources consumption, reduce the transport needs if the elements are precast. These facts can provide a short term economic benefit. The economic benefits also exist at medium and long term, as the durability of UHPFRC is very high and maintenance is extremely reduced.

Economic benefits are obtained when a structure or element are redesign taking the full advantage of the advanced concrete properties.

Stage of Development

Already on the market

IPR Status

Secret Know-how

Profile Origin

Private (in-house) research

Keywords

Technology

02006001	Materials, components and systems for construction
02006002	Construction methods and equipment
02007002	Building materials
07003001	Aquaculture
07003002	Fish / Fisheries / Fishing Technology

Market

09003001	Engineering services
09007001	Construction companies
09007005	Facility management companies

NACE

C.23.6.9	Manufacture of other articles of concrete, plaster and cement
F.41.1.0	Development of building projects
F.41.2.0	Construction of residential and non-residential buildings
F.42.1.3	Construction of bridges and tunnels
F.42.9.1	Construction of water projects

Open for EOI : Yes

Dissemination

Send to Sector Group

Materials

Client

Type and Size of Organisation Behind the Profile

Industry SME <= 10

Year Established

2015

Turnover

<1M

Already Engaged in Trans-National Cooperation

No.

Languages Spoken

French
Serbian
Croatian
Spanish

Client Country

Spain

Partner Sought

Type and Role of Partner Sought

The company looks for partners from the construction sectors (footbridges, blue growth, urbanism, civil engineering) with who design and implement projects that require the use of materials with special characteristics such as the ones in the advanced concretes.

The company would also be interested in being contacted by organizations (companies, research centres and universities) to carry out the development of new materials with new properties and applications, mainly addressed to the blue growth.

Type and Size of Partner Sought

SME 11-50,251-500,SME 51-250,>500

Type of Partnership Considered

Technical cooperation agreement
Research cooperation agreement

Attachments