

USE OF COLLOIDAL SILICA NANOPARTICLES TO OBTAIN REINFORCED FILLERS IN EPOXY-COMPOSITES FROM MUNICIPAL SOLID WASTE INCINERATION FLY ASH

TECHNOLOGY OVERVIEW

Colloidal Mesoporous Silica Nanoparticles (CMSNs) have been developed under room temperature and using a very low concentration of surfactant. As they have meso-pore size and high surface area, they can bind and stabilise the municipal solid waste incineration (MSWI) ash by locking up heavy metal contaminants. An optimised, no hazardous organic template is applied to achieve nanoparticles. CMSNs are obtained by undergoing a sustainable process of removing the surfactant and template. The treatment of ash has been done at a proof-of-concept level and it is ready for further scale-up. The stabilised ash has been tested in accordance with the proposed European Standard procedure to ensure their suitability for use in manufacturing.

MARKET OPPORTUNITIES

An estimated saving of 20-30% of production cost can be achieved for polymer fillers if the raw materials originate from incineration ash. The market value of polymer composites is predicted to reach US\$89.4 billion by 2020.

POTENTIAL APPLICATIONS

The MSWI ash can be transformed into reinforced fillers for fabrication of high quality composites using CMSNs. The composites and chemically stabilised ash can be used in sectors like aircraft, appliance, transportation, civil infrastructure, construction, and electrical, marine and corrosion-resistant equipment. Well-dispersed CMSNs which possess high porosity, thermal and mechanical stability can also be used as nano-fillers embedded in silica or polymer matrixes to produce nanocomposites films. CMSNs can potentially be used as catalysts in manufacturing.

COMMERCIALISATION

This technology is available for licensing and technology transfer. A provisional patent application has been filed.

CONTACT DETAILS

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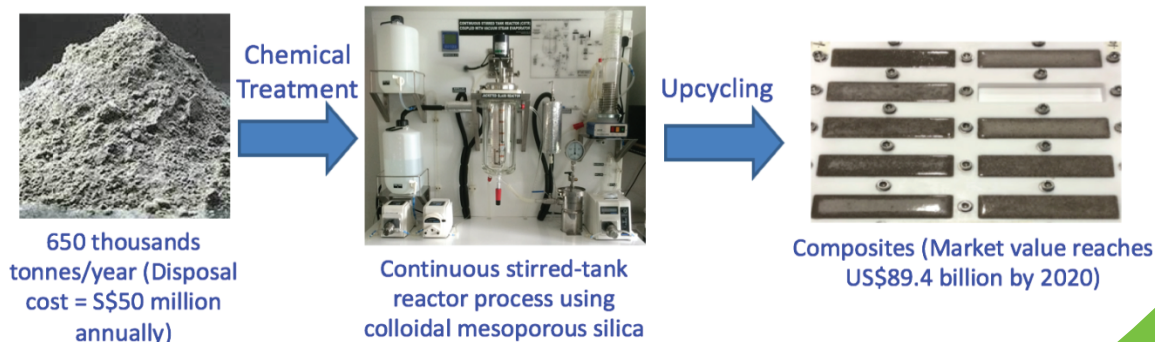


Figure 1: Schematic diagram of the low-energy process for the treatment of incineration ash under cost-effective solution, Colloidal mesoporous Silica nanoparticles to use as polymer fillers for polymer composites.

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