



Biochar as a Sustainable Cement Replacement

SP Singapore Polytechnic

Technology Licensing Opportunity

Technology Overview

Biochar a sustainable byproduct derived from the pyrolysis of waste materials as an alternative to replace traditional cement. The cement industry has long been a part of the growing environmental concern surrounding carbon footprint, contributing to 8% of total CO₂ emissions. Biochar offers a promising solution by harnessing its carbon sequestration capabilities and enhancing cement properties.

Biochar Sources:

- Rice husk
- Wood waste
- Plastic waste

This technology makes use of the above mentioned three distinct types of biochar that were separately used as partial replacements for cement. Each type of biochar possesses unique physical and chemical properties, necessitating careful treatment to enhance its potential before blending with cement. This ensures that the durability and chemical properties of the cement remain unaltered and comply with cement test requirements. The blended cement undergoes leaching assessments to ensure adherence to environmental regulations. Additionally, it is tested in accredited third-party laboratories to validate its physical and chemical characteristics, confirming its performance.

The technology aims to reduce the embodied carbon footprint of cementitious materials and decrease the reliance on raw materials.

Potential Applications

Potential application of Biochar blended cement (but not limited to):

- Cementitious blend
- Ready-mix concrete products
- Precast concrete products
- Soil stabilizers

Commercialization / R&D Opportunities

- ✓ Ready for commercialization
- ✓ Looking collaborators for further development / to develop new applications
- ✓ Available for licensing
- ✓ Accepting business plans from interested parties

Intellectual Property -

- Know-how / Trade Secret

Technology Features & Specifications

Biochar has several technical advantages for use in construction, including its use as a sustainable building material and reducing the embodied carbon footprint by partially replacing cement with various sources of biochar. It helps to convert waste material into cement replacement, combining durability and sustainability for a wide range of cement applications.

- Biochar blended cement reduces the embodied carbon footprint of cementitious materials
- Enhanced durability characteristics of blended cement
- Locally produced biochar eliminates the need for foreign import
- Economically viable and effective pre-treatment method of biochar
- Toxicity impact assessment verified by leaching tests
- Physical and chemical properties of blended cement validated by accredited third-party laboratories
- Potential carbon sequestration additive
- Acts as a cement tint for aesthetic enhancement

Unique Value Proposition

- Biochar produced in Singapore offers multiple advantages as a cement replacer and potential carbon sequestration additive. Local production eliminates the need for foreign imports, ensuring a lower carbon footprint and providing a cost-effective solution. It facilitates the use of waste materials and enhances the mechanical properties of cementitious materials. Rigorous testing in accredited third-party laboratories has validated the performance and reliability of Singapore's biochar, ensuring it meets all cement test requirements and adheres to industry standards and regulatory guidelines. This technology marks a crucial step towards a circular economy.

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