TECH OFFER

Carbon Mineralization Technology for Upcycling of Industrial Solid Waste

KEY INFORMATION

TECHNOLOGY CATEGORY:
Waste Management & Recycling - Industrial Waste Management
Sustainability - Low Carbon Economy

TECHNOLOGY READINESS LEVEL (TRL): **TRL9**
COUNTRY: **CHINA**
ID NUMBER: **TO175134**

OVERVIEW

With rising concerns about carbon emissions, Carbon Capture, Utilization and Storage (CCUS) plays a crucial role in combating climate change. CCUS helps reduce emissions by capturing carbon from flue gas, removing carbon from the atmosphere, and transforming captured carbon into value-added products. However, conventional CCUS technologies often involved high energy consumption and operational expenses. Current carbon mineralization processes face challenges such as slow reaction rates, limited scalability, and high associated costs.

To address these challenges, the technology owner has developed an economically viable carbon mineralization technology that integrates carbon fixation and the reuse of industrial solid wastes in an integrated manner. This technology targets both carbon utilization and long-term carbon storage. It focuses on using alkaline industrial solid wastes, such as steel slag, fly ash, and cement waste, which are rich in calcium and magnesium oxides, to efficiently sequester CO_2. The process involves leaching calcium and magnesium ions from slag and precipitating them as carbonates for various applications.

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This modular technology is scalable and adaptable to different waste materials, promising substantial carbon reduction and transforming industrial waste into valuable resources. Implementing this technology allows steel, cement and chemical companies to tackle high carbon emissions and waste disposal issues simultaneously. The final product, with carbon-negative properties, helps downstream clients reduce the carbon footprint of their products, such as plastic, paper, rubber tires, paint and cement.

The technology owner is seeking collaboration with industrial partners, especially industrial waste producers, high carbon emission plants, cement companies using post-carbonation slag, and manufacturers of paper, plastic, and rubber.

TECHNOLOGY FEATURES & SPECIFICATIONS

The technology consists of a carbon mineralization plant with 4-steps facilities:

- **Reaction Facilities:** extract calcium ions from industrial solid wastes using CO_2 based acid
- **Solid-Liquid Separation Facilities:** separate liquid enriched with calcium ions and the post-carbonation slag
- **Precipitation Facilities:** produce calcium carbonate
- **Drying Facilities:** dry the final product to meet client's requirement

Key features of this technology include:

- **Flexible CO2 Sources:** can use ambient air, flue gas from various plants, or any gas mixtures containing CO_2
- **Lower Energy Consumption:** utilizes industrial waste, reducing energy-intensive raw material processing
- **Cost-Effective:** reagent recycling minimizes material costs, making the process economically viable
- **Scalability:** modular and adaptable design allows for easy scaling and application across various industries
- **Environmental Impact:** converts waste into valuable products, addressing CO_2 emissions and industrial waste

POTENTIAL APPLICATIONS

Industries for Deployment:

- Steel plants
- Cement plants
- Coal power plants
- Other industrial sites producing CO_2 emissions and solid wastes

Marketable Products:

- High-purity calcium carbonates for various industrial applications such as plastic, paper, paint, rubber tyre, etc.
- Post-carbonation slag with low iron content can be used as supplementary cementitious materials (SCM) for clinker
- Post-carbonation slag with high iron content can be recycled to the sinter plant as sinter ore

UNIQUE VALUE PROPOSITION

- **Dual Benefit:** combines carbon capture and waste management
- **Economic Viability:** generates revenue from products, offsetting costs
- **Flexibility:** adaptable to various industries and CO2 sources
- **Sustainability:** support a circular economy by turning waste into resources