

Carbon Capture Utilization and Storage (CCUS): CO₂ Utilization in Building Construction (HCP-48)

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Abstract

This study focuses on the development of artificial lightweight aggregates (LWAs) using fly ash and lime based sludge as raw materials. The aggregates are prepared through a disc pelletizer, followed by optimizing w/s ratio, pelletization duration, speed of pelletizer. The aggregates are autoclaved under varying pressures and temperatures to enhance their structural integrity. Post-autoclaving, the aggregates are kept for CO₂ uptake in a carbonation chamber aiming to improve their environmental sustainability and performance. The developed aggregates are characterized by equipment like X-ray diffraction (XRD), thermogravimetric analysis (TGA) and Field Emission Scanning Electron Microscopy FESEM to understand their mineralogical, thermal and morphological properties. Physical properties of aggregates like bulk density, water absorption, specific gravity and mechanical properties such as single-pellet strength, impact strength are being evaluated. This research contributes to sustainable construction materials by valorizing industrial by-products and reducing carbon emissions through innovative material processing and CO₂ sequestration techniques.

Objectives- Development of artificial aggregates through carbon sequestration using industrial wastes