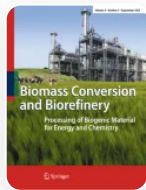


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Investigation on mechanical and thermal properties of clay brick additions with sugarcane bagasse ash and nanoparticles

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Abstract

Over the year, garbage from industry establishments' everyday operations included several different sorts. For instance, among the most prevalent industrial wastes formed in India is sugarcane bagasse ash (SCBA). This study's main goal is to examine the possibilities for using SCBA in burnt clay bricks. Using mechanical and thermal characteristics, the impact of SCBA and ruthenium (Ru) nanoparticle additions to the brick production clay has been studied. To achieve this, combinations of brick-making clay containing 15 wt% SCBA and

different weight portions of Ru nanoparticles (by 0, 1, 3, 5, and 7%) were hydraulically uniaxially squeezed and sintered at 1000 °C. Compressive strength, thermogravimetric analysis (TGA), and a water absorption test were among the mechanical and thermal parameters that were assessed and contrasted. Using a scanning electron microscope, the microstructure of the specimen's interfacial layer was also investigated. Additionally, Fourier-transform infrared spectroscopy is used to examine the novel nano clay brick's chemical structure. A clay brick with up to 5 wt% Ru nanoparticles has greater compressive strength (32.6 MPa maximum) and thermal strength (8.8% wt loss) than a brick with 0 wt% (24.8 MPa and 31% wt loss), according to experimental results. However, the compressive and thermal strengths were decreased for 7% Ru nanoparticles brick (30.2 MPa and 9.1% wt loss).

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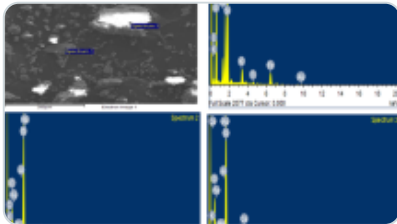
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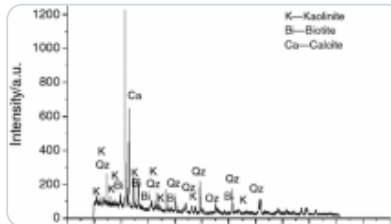
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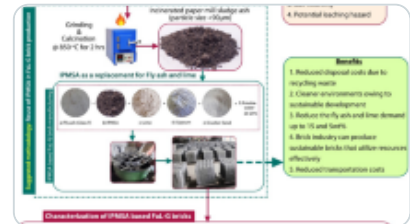
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Polymers

Abbreviations

SCBA: Sugarcane bagasse ash

BMC: Brick-making clay

Ru: Ruthenium

Wt %: Weight loss

TGA: Thermogravimetric analysis

NCB: Nano clay brick

V.S: Very strong

S: Strong

M: Medium

W: Weak

V.W: Very weak

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Ethics declarations

Ethics approval and consent to participate

Informed consent was obtained from all individual participants included in the study.

Conflict of interest

The authors declare no competing interests.

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