

Abstract

Optimization of a New Material with Clay and Waste Coffee Grounds for Additive Manufacturing [†]

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Abstract: This article aims to study a new ceramic paste mixing red clay with coffee residues in 3D printing, proposing an effective solution for the recycling of coffee residues. Intense studies were made on clay paste containing 5, 10, 15, and 20% coffee grounds. The morphological and chemical aspects were evaluated through SEM, Micro CT, and FTIR images; physical and mechanical properties were assessed by mechanical resistance, absorption, and drying tests, with the aim to obtain results on the hardness, permeability, absorption, and weight; finally, 3D-printing tests were performed to study the paste behavior and understand its advantages in new emerging technologies. The incorporation of coffee residues in red clay results in a light and very porous product; thus increasing the water absorption and apparent porosity. Some pieces were created to test the structural capacity and consistency of the paste. The idea was to create bricks, floors, and coverings.

Keywords: sustainability; construction; clay; 3D printing; waste coffee grounds; materials; characterization; product design



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