

Nano geopolymer for sustainable concrete using fly ash synthesized by high energy ball milling

Abstract

This paper presents the development of a nano geopolymer for sustainable concrete using fly ash synthesized by high-energy ball milling. In this paper, we report on our investigation of the effects of grinding on the binder properties and the optimization of the mix design for nano geopolymer paste. The research methodology consisted of synthesizing fly ash by using a high energy ball mill to create nanosized particles and determining the formulation and mix proportions required to produce a nano geopolymer paste with the addition of an alkaline activator. The ratio of fly ash to alkaline activator and sodium silicate to sodium hydroxide were constant for the entire experiment which is 2.5. Ball milling was conducted for the total duration of six hours, during which particle size was reduced from 10 μm to 60 nm. The nano geopolymer were cured at temperature 70°C and then tested on 1st day and 7th day for compressive strength. Scanning electron microscopy (SEM) was used to characterize the shape, texture, and size of the milled fly ash.

Keywords

Ball milling; Compressive strength; Fly ash; Nano geopolymer