

Microstructure study on optimization of high strength fly ash based geopolymer

Abstract

The compressive strength and microstructural characteristics of fly ash based geopolymer with alkaline activator solution were investigated. The sodium hydroxide and sodium silicate were mixed together to form an alkaline activator. Three parameters including NaOH molarity, mix design (fly ash/alkaline activator ratio and $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio), and curing temperature were examined. The maximum strength of 71 MPa was obtained when the NaOH solution of 12M, fly ash/alkaline activator of 2.0, $\text{Na}_2\text{SiO}_3/\text{NaOH}$ of 2.5 and curing temperature of 60°C were used at 7th days of testing. The results of SEM indicated that for geopolymer with highest strength, the structure was dense matrix and contains less unreacted fly ash with alkaline activator.