

Fabrication of coal ash-based geopolymer foam using Al powder

허지희, 김효[†]

서울시립대학교

(hkim@uos.ac.kr[†])

In recent years, porous geopolymer, so-called geopolymer foam, has attracted attention due to its light weight and low thermal conductivity, as well as fire-resistance. In this study, the geopolymer foams were fabricated from coal bottom ash (CBA) and coal fly ash (CFA), and their flow, bulk density, thermal conductivity, compressive strength, and microstructure were investigated under the varied mix proportions; the foams were produced by adding Al powder into the mixture of CBA, CFA, 14 M NaOH solution, and surfactant at various CBA/CFA ratios of 0, 0.5, 1, and 2, NaOH solution/coal ash (L/S) ratios of 0.34~0.70, and Al powder contents of 0.10, 0.15, and 0.20% by weight of coal ash. As a result, the minimum bulk density and thermal conductivity among the CBA-containing geopolymer foams were achieved at CBA/CFA ratio=1 with 0.15% Al powder as low as 0.498 g/cm³ and 0.1520 W/mK, respectively. Meanwhile, the compressive strength of the foams was decreased with the increment of CBA and Al powder due to low reactivity of CBA and highly porous structure, respectively. Nevertheless, these geopolymer foams have a high potential as an eco-friendly and cost-effective inorganic material.