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Mechanical and Micro-Structural Properties of Fly Ash Based Geopolymer with High-Temperature Exposure

Authors : Young-Cheol Choi, Joo-Hyung Kim, Gyu-Don Moon

Abstract : This paper discusses the effect of Na2O (alkali) content, SiO2/Na2O mole ratio, and elevated temperature on the mechanical performance of fly-ash-based inorganic green geopolymer composites. Fly-ash-based geopolymers, which were manufactured with varying alkali contents (4–8 % of fly ash weight) and SiO2/Na2O mole ratios (0.6–1.4), were subjected to elevated temperatures up to 900 ºC ; the geopolymer composites and their performance were evaluated on the basis of weight loss and strength loss after temperature exposure. In addition, mineralogical changes due to the elevated temperature exposure were studied using x-ray diffraction. Investigations of microstructures and microprobe analysis were performed using mercury intrusion porosimetry. The results showed that the fly-ash-based geopolymer responded significantly to high-temperature conditions.

Keywords : fly ash, geopolymer, micro-structure, high-temperature, mechanical structural
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