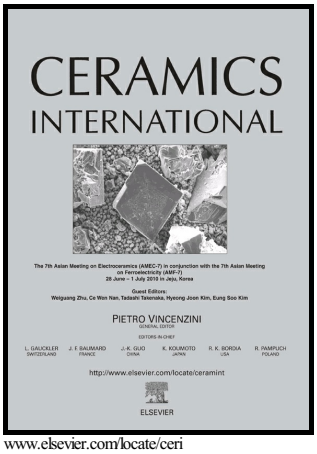

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Improving Compressive Strength of Fly Ash-Based Geopolymer Composites by Basalt Fibers Addition

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Abstract

In this study, ASTM Class C fly ash used as an alumino-silicate source was activated by metal alkali and cured at low temperature. Basalt fibers which have excellent physical and mechanical properties were added to fly ash-based geopolymers for 10-30% solid content to act as a reinforced material, and its influence on the compressive strength of geopolymer composites has been investigated. XRD study of synthesized geopolymers showed an amorphous phase of geopolymeric gel in the 2θ region of 23-38° including calcium-silicate-hydrate (C-S-H) phase, some crystalline phases of magnesioferrite, and un-reacted quartz. The microstructure investigation illustrated fly ash particles and basalt fibers were embedded in a dense alumino-silicate matrix, though there was some un-reacted phase occurred. The compressive strength of fly ash-based geopolymer matrix without basalt fibers added samples aged 28 days was 35 MPa which significantly increased 37% when the 10 wt.%. basalt fibers were added. However, the addition of basalt fibers from 15 to 30 wt.% has not shown a major improvement in compressive strength. In addition, it was found that the compressive strength was strong