

## Scanning Electron Microscopy of Cement Clinkers Produced Using Alternative Fuels

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**Abstract :** Cement production is one of the most energy-intensive processes consuming a high amount of thermal energy. Nowadays, alternative fuels are being used in cement manufacturing in a large scale as a help to provide the necessary energy. The alternative fuels could consist of any disposal like waste plastics, used tires and biomass. It has been suggested that the clinker properties might be affected by using these fuels because of foreign elements incorporation to the composition. Studying the distribution of clinker phases and their chemical composition is possible with scanning electron microscopy (SEM). In this study, clinker samples were produced using different alternative fuels in cement firing kilns. The microstructural observations by back-scattered electrons (BSE) mode in SEM (JEOL JSM-6010LV) showed that the clinker phase distribution was dissimilar in samples prepared with different alternative fuels. The alite to belite (a/b) phase content of samples was quantified by image analysis. The results showed that the a/b varied between 5.2 and 1.5 among samples as the average value for six clinker nodules. The elemental analysis by energy-dispersive x-ray spectroscopy (EDS) mounted on SEM indicated the variation in chemical composition among samples. Higher amounts of sulfur and alkalis seemed to reduce the alite phase formation in clinkers.

**Keywords :** alternative fuels, cement clinker, microstructure, SEM

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