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A study on the MSWI fly ash modifying for inorganic gel of cement admixtures

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Municipal solid waste incinerator (MSWI) fly ashes contain high concentrations of heavy metals and dioxins which are hazardous wastes. Recycling of the fly ash will be a future tendency in many countries. Wet ball milling fly ash replacing cement has the potential as pozzolanic materials. In addition, the reaction of a pozzolanic material with an aqueous alkali hydroxide or sodium silicate solution produces an inorganic gel material with high strength. The purpose of this study is to transfer the MSWI fly ash into inorganic gel in order to form a cement admixture. In this study, the washed fly ash was mixed with metakaolin in accordance with the specific ratio then milled and activated with different concentrations of NaOH solution in different times. The produced activated powder was used as 5% and 10% of cement replacement. The FTIR and XRD analysis were used to find out the better condition on the activation of inorganic gel. The results showed that, the reaction of 50% metakaolin, 50% washed fly ash (5C5W) with 1M NaOH solution after 24 hr milling produces multiple crystal species of inorganic gel. Besides, TCLP all the condition of activated powder can pass the hazard waste limit. When the activation of different conditions of milling powder replaces 10% of cement, low workability results relative lower compressive strength. But replacing 5% cement grouting to cure 7 days and 28 days, could raise about 100% of the compressive strength and form an inorganic gel in the cement with best characteristic. For activated powder process, milling activation has more contribution than stirring activation in the formation of inorganic gel and helps the growth of inorganic gel in cement curing.

Biography

Sue-Huai Gau has completed his PhD from Taiwan University. He is the Professor of the Department of Water Resources and Environmental Engineering, Tamkang University. He is a specialist in the field of Solid Waste Management and Resource Recovery. He has published more than 100 papers in reputed journals and conferences.

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