

TWENTY-SECOND ANNUAL CONFERENCE

YUCOMAT 2021

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New environmentally acceptable materials based on fly ash, steelmaking slag and Zn-rich electric arc furnace dust

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The newer methods of electric arc furnace dust (EAFD) valorisation include its stabilization into materials which potentially can be used in construction. This is the most promising method because of the low costs and waste reduction. The purpose of these study was to investigate the properties of alkali activated cement (AAC) based on fly ash (FA) or steelmaking electric arc furnace slag (EAFS) as an agent for stabilization/solidification of EAFD. The control type of AAC samples were prepared by mixing of solid precursor (FA or EAFS) with a mixture of 10 M NaOH and Na₂SiO₃ solutions followed by curing at in the oven for 48 h at 65 °C.

The samples of AAC doped with EAFD were prepared at the same conditions but the EAFD was added to the starting mixtures with FA in quantities of 10, 20 and 30% of total solid phase and 1, 2, 5 and 7 % of total EAFS solid phase.

The results have shown that both, FA and EAFS can be successfully used as an agent for EAFD stabilization. AAC samples based of FA and EAFS exhibited strength which is suitable for both, landfill and construction applications. Stabilization of EAFD into the AAC matrix occurred by chemical and physical immobilization. Chemical immobilization of Zn into the reaction product of FA and EAFS alkali activation was confirmed by SEM/EDS investigations.

The leaching of Zn from both, AAC matrix based on FA and EAFS is inferior in comparison to pristine EAFD and met the criteria for granular waste disposal at landfills for non-hazardous waste according the EN 12457-2 test.