ADVANCE MATERIAL AND CORROSION SCIENCE

CHARACTERIZATION OF SEWAGE SLUDGE ASH (SSA) IN CEMENT MORTAR (FLUIDSCHE-2015-137)

Siew Choo Chin[1*], Shu IngDoh, Andri Kusbiantoro[2], Yih Kang Wong[1] and SaffuanWan Ahmad[1]

[1]Faculty of Civil Engineering and Earth Resources, [2]Faculty of Engineering Technology, Universiti Malaysia Pahang, LebuhrayaTunRazak, 26300 Gambang, Kuantan, Pahang, Malaysia.
*Corresponding author: scchin@ump.edu.my

Abstract

Sewage sludge ash (SSA) is a waste material obtained from the incineration of wastewater sludge. The SSA generated from the burning usually is disposed of to the landfill which is not the final solution. Hence, an investigation was carried out to study the potential use of SSA in cement based materials. The chemical and mineralogical characteristics of SSA in cement mortar are presented in this paper. Effect of incineration temperature and percentage of SSA as partial cement replacement in cement mortar were examined. The percentage of SSA considered in this study was 10% replacement of the mass of cement whereas the incineration temperatures investigated was at 600° and 800°C. The tests conducted in this study including X-ray Diffraction (XRD), X-ray Fluorescence (XRF) and Field Emission Scanning Electronic Microscope (FESEM) and compressive strength test. Results show that a significant amount of SiO_2, Al_2O_3 and CaO was traced after the incineration process. Mortar samples with 10% replacement of 800°C burnt SSA improves the compressive strength up to 1.14% and 5.06% at the ages of 28 and 90 days, respectively. The FESEM test results show that SSA samples in 600°C exhibited needle-shape particles and a smooth structure in 800°C due to pozzolanic activity which filled the void and pores in the mortar. The bonding also provides additional strength to the mortar in which the compressive strength has increased after 28 and 90 days.

Keywords: *Incineration, Mineralogical, Percentage Replacement, Sewage Sludge ash, Temperature.*
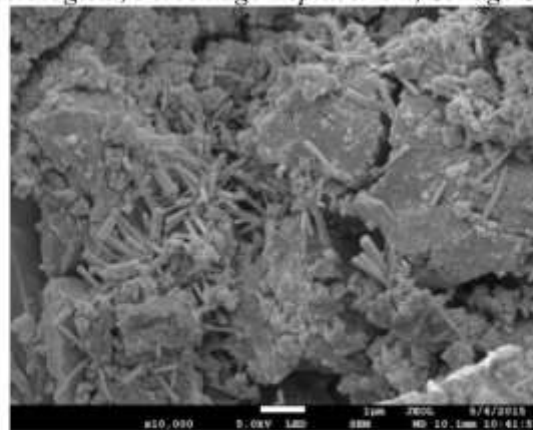

Figure-1: FESEM image of A10 SSA mortar at 10 kx