

Article

Corrosion of steel in synthetic fly ash pore solution

Juan Bosch Giner *, Ulises Martin, Jacob T Ress, David M. Bastidas *

The University of Akron

Abstracts: Herein, the corrosion behavior of steel exposed to fly ash (FA) synthetic pore solution and carbonated FA synthetic pore solution is presented. A better understanding of corrosion phenomena of steel embedded in FA binder will be achieved if the corrosion mechanisms in the pore solution are disentangled. As such a more sustainable cementing material will be suitable for the construction industry. Electrochemical tests such as cyclic potentiodynamic curves (CPP) and electrochemical impedance spectroscopy (EIS) were performed in order to characterize the corrosion behavior of steel in chloride contaminated FA synthetic pore solution as well as the carbonation effect. Results showed that FA synthetic pore solution was able to repassivate the steel even with chloride contents of 0.1M NaCl. Furthermore, the combined effect of chloride and carbonation induced corrosion was observed, showing corrosion rates of 3.547×10^{-5} A/cm² in FA carbonated pore solution containing 0.6M NaCl.

Keywords: geopolymer; fly ash; pore solution
