



Study of corrosion layer formed in cementitious media

In cementitious material, the pore solution is highly alkaline. In these chemical conditions, a corroded film forms on the surface of rebars. This film protects the steel from further corrosion. It is generally composed of a duplex layer: a thin inner passive layer (in contact with steel) and a more or less porous outer layer (in contact with environment). The latter is in contact with the environment and formed by precipitation from solution elements. It should be noted that the duplex structure would play a key role in susceptibility to pitting corrosion of the passive layer as the outer layer would act as a barrier and therefore modified the accessibility of chloride anions to the external interface of the passive layer. The objective of this work is to identify the new-formed phases composing the outer layer and to determine the conditions of formation of these new compounds. The experimental approach consist in mixing iron powder into cementitious pore solution at relatively high temperature (80°C). At the end of the experiment, solid and solution are analyzed to determine the mass balance of major ion (calcium, sulfate and alkalis). The solution will be analyzed by ionic chromatography, and if necessary by ICP. The solid will be characterized by methods like XRD, Raman, Infrared or TEM. The aims are:

- to quantify the kinetics of dissolution of initial minerals
- and, if possible, to identify the new-formed phases.

Period: 2 years (2017-2018)

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