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# Effect of selected nano-materials on corrosion initiation period of reinforced concrete

**Philip Mogire**
University of Nairobi, Kenya

Service life of reinforced concrete is composed of initiation and propagation period. Over the last decade nanomaterials have been investigated for production of concrete with superior properties. This research work examines the effect of nano-Silicon dioxide, Titanium dioxide, Aluminum oxide and Ferric Oxide on corrosion initiation period of reinforced concrete. The physical and chemical properties of the materials were investigated for compliance for use in reinforced concrete. Concrete of class M25 was cast. For each Nano-material dozed,9 specimens for compression and split tensile strength respectively was prepared and tested at 7,14 and 28 days. A model for compressive and split tensile strength respectively was proposed and compared with other published models. A parametric study of the critical penetration depth -a component of the corrosion initiation period, was done. From the results of the study, the proposed and published compressive and split tensile strength models compares well. It was also noted that the critical penetration depth increases with an addition of the selected nano-materials at optimal dosages, Nano-Silicon dioxide having the highest increase. The corrosion initiation period linearly increases with a dozed selected nano-material. The effect of incorporating nano-material in concrete can be considered as an input parameter in the initiation period in corrosion service life models. Silicon dioxide is an abundant natural material and its use in concrete in nano-particle state will constitute sustainable consumption and production of cement.

**Keywords**: Corrosion initiation period, Critical penetration depth, Nano-materials.

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