

**Title:** Electrochemical and analytical investigation of passive films formed on stainless steels in alkaline media

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**Source:** Cement & Concrete Composites

**Volume:** 34 **Issue:** 9 **Pages:** 1075-1081 **DOI:** 10.1016/j.cemconcomp.2012.06.002

**Published:** Oct 2012

**Document Type:** Article

**Language:** English

**Abstract:** Passive films were grown in potentiodynamic mode, by cyclic voltammetry on AISI 316 and AISI 304 stainless steels. The composition of these films was investigated by X-ray photoelectron spectroscopy (XPS). The electrochemical behaviour and the chemical composition of the passive films formed by cyclic voltammetry were compared to those of films grown under natural conditions (by immersion at open circuit potential, OCP) in alkaline solutions simulating concrete. The study included the effect of pH of the electrolyte and the effect of the presence of chloride ions. The XPS results revealed important changes in the passive film composition, which becomes enriched in chromium and depleted in magnetite as the pH decreases. On the other hand, the presence of chlorides promotes a more oxidised passive layer. The XPS results also showed relevant differences on the composition of the oxide layers for the films formed under cyclic voltammetry and/or under OCP. (C) 2012 Elsevier Ltd. All rights reserved.

**Author Keywords:** Passive Film; Cyclic Voltammetry; Stainless Steel; XPS

**KeyWords Plus:** Ring-Disk Electrode; Impedance Spectroscopy; Semiconducting Properties; Alloying Elements; Pitting Corrosion; Behavior; Iron; Molybdenum; Chlorides; Layers

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**Publisher:** Elsevier SCI LTD

**Publisher Address:** The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, Oxon, England

**ISSN:** 0958-9465

**Citation:** Freire L, Catarino M A, Godinho M I, Ferreira M J, Ferreira M G S, Simões A M P, Montemor M F. Electrochemical and analytical investigation of passive films formed on stainless steels in alkaline media. Cement & Concrete Composites. 2012; 9 (34): 1075-1081.