SUSCEPTIBILITY TO STRESS CORROSION CRACKING OF STAINLESS STEELS: THE ROLE OF MOLYBDENUM

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The role of alloying elements on the susceptibility to Stress Corrosion Cracking (SCC) of stainless Steel is well documented in the literature, particularly the effect of molybdenum. However, the role of this element on film properties is not well understood. The approach used in this work includes the study of high purity austenitic Fe-Cr-Ni model alloys, with and without Mo additions, as well as the effect of deformation. A Mott-Schottky study was conducted complimented with polarization measurements in SCC environments containing chloride ions. Results show that Mo promotes stress corrosion cracking in the otherwise nonsusceptible alloy, confirming previous data. SCC is associated to the presence of a semiconducting film, which is predominantly p-type character (transport controlled by cationic vacancies). The doping density, estimated for samples with equivalent levels of plastic deformation was found to be larger for the Mo containing alloy. Mechanisms are discussed focussing the metal/film interface and the possible effect of dislocations on film properties, for the SCC case. The role of Mo regarding other types of localized corrosion such as pitting will also be discussed, on the basis of phenomena in the film/solution interface.