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FORMATION OF OXYANIONS IN PASSIVE FILM OF STAINLESS STEELS

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Olefjord *et al.* proposed that the synergistic effect between Mo and N is due to enrichment of Mo, Ni and Cr at the metal-electrolyte interface of initiated pits. Nitrogen is expected to compensate for the pH drop in the pits by reaction with H^+ and formation of NH_3 and NH_4^+ . Repassivation is enhanced by the increased pH value in the pits and the higher concentration of Cr, which forms the passive film. Lu *et al.* explained this effect by the formation of nitrides on the surface of anodically polarized stainless steel, thus, inhibiting the transpassive dissolution of molybdenum. Also, according to Olsson, the synergistic effect between nitrogen and molybdenum could result when nitrogen buffers the pH of the solution near the passive layer and, thus, alters the passive film environment to be more stable for compounds containing molybdates. On the other hand, Kim *et al.* previously suggested that the synergistic effect comes from increased Mo enrichment and increased molybdate ion due to the cation selectivity of the NO_3^- ion in the passive film. The increased cation selectivity could increase the ratio of $Cr_2O_3/Cr(OH)_3$, the activation energy for pit initiation, and the repassivation rate.

According to the bipolar model, ion selectivity of some species in the passive film is important factor to control the passivation. An increase of cation selectivity of outer layer of the passive film can stabilize the film and improves the corrosion resistance. Of course, inverse case is possible. Therefore, the formation and roles of ionic species in the passive film should be elucidated. In this work, two types of solution (hydrochloric or sulfuric acid) were used to test high nitrogen-bearing stainless steels (>0.35% N).