

CS05

A Study on the Effects of Anion Additives on the Growth of the Pit formed on Pure Aluminium in 0.1 M NaCl Solution

0.1 M NaCl 수용액에서 순수한 알루미늄에 형성된 핏트의 성장에 미치는 음이온의 영향에 대한 연구

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The effects of anion additives NO_3^- and SO_4^{2-} ions in 0.1M NaCl solution on the growth of the pit formed on pure aluminium (Al) were investigated as a function of anion concentration using potentiostatic current transient technique and optical microscopy combined with auger electron spectroscopy (AES). The three kinds of the solutions 0.1 M NaCl, NO_3^- and SO_4^{2-} ions-containing 0.1 M NaCl solutions, were employed. From the potentiostatic current transients, current value increased with increasing SO_4^{2-} ion additives, while it decreased in the case of NO_3^- ions. The application of fast fourier transformation (FFT) to current fluctuations on current transients obtained in the three solutions, revealed that SO_4^{2-} ions accelerate the growth of the pits, on the other hand, NO_3^- ions act as effective inhibitors. Furthermore, cross-sectional view of an artificial pit, made by drilling the hole of 1 mm diameter and 1 mm depth into the specimen, showed the morphological change of the growing pit with addition of NO_3^- and SO_4^{2-} ions to NaCl solution. The compositions of passive film formed at pit wall or bottom in the three solutions were determined from the measured AES spectra. Based upon the experimental results, the morphological change of the growing pit through pure Al was discussed in terms of preferential growth direction in NO_3^- and SO_4^{2-} ions-containing NaCl solutions.

References

1. U. Bertocci and F. Huet, Corrosion(NACE), 51 (1995) 131
2. J.-J. Park et al., Corrosion(NACE), 55 (1999) 380