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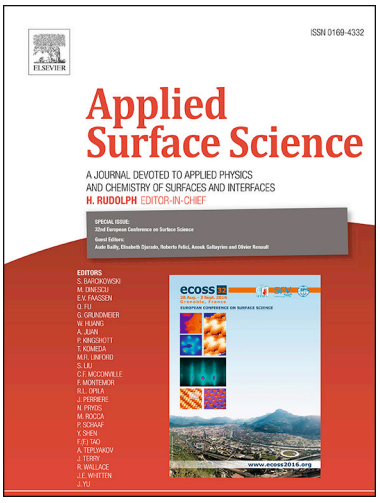

Full Length Article

Surface monitoring for pitting evolution into uniform corrosion on Cu-Ni-Zn ternary alloy in alkaline chloride solution: *ex-situ* LCM and *in-situ* SECM

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Surface monitoring for pitting evolution into uniform corrosion on Cu-Ni-Zn ternary alloy in alkaline chloride solution: *ex-situ* LCM and *in-situ* SECM

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Abstract

The evolution of the corrosion process on Cu-Ni-Zn alloy in alkaline chloride solution was investigated by *in-situ* scanning electrochemical microscopy, X-ray photoelectron spectroscopy, and *ex-situ* laser confocal microscopy, and the effects of ambient temperature and polarization time were also discussed. The results demonstrated a higher pitting nucleation rate and lower pit growth rate at low temperature. The ratio of pit depth to mouth diameter decreased with increasing pit volume and temperature, indicating that pits preferentially propagate in the horizontal direction rather than the vertical direction owing to the presence of corrosion products and deposited copper. The surface current was uniform and stabilized at approximately 2.2 nA during the passive stage, whereas the current increased after the pits were formed with the maximum approaching 3 nA. Increasing the temperature led to an increase in porous corrosion products (CuO, $Zn(OH)_2$, and $Ni(OH)_2$) and significantly increased the rate of transition from pitting to uniform corrosion. Dezincification corrosion was detected by energy dispersive spectrometry, and a

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