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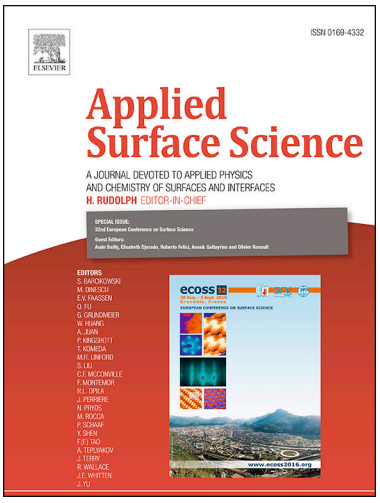

Full Length Article

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In-situ electrochemical-AFM study of localized corrosion of $Al_xCoCrFeNi$ high-entropy alloys in chloride solution

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Abstract

In-situ electrochemical (EC)-AFM is employed to investigate the localized corrosion of the $Al_xCoCrFeNi$ high-entropy alloys (HEAs). Surface topography changes on the micro/sub-micro scale are monitored at different applied anodizing potentials in a 3.5 wt.% NaCl solution. The microstructural evolutions with the increased Al content in the alloys are characterized by SEM, TEM, EDS and EBSD. The results show that by increasing the Al content, the microstructure changes from single solid-solution to multi-phases, leading to the segregations of elements. Due to the microstructural variations in the $Al_xCoCrFeNi$ HEAs, localized corrosion processes in different ways after the breakdown of the passive film, which changes from pitting to phase boundary corrosion. The XPS results indicate that an increased Al content in the alloys/phases corresponds to a decreased corrosion resistance of the surface passive film.