Effect of surface roughness on corrosion behavior of 70Cu-30Ni tubes in flowing seawater

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Abstract In this study，the effect of surface roughness on the corrosion behavior of 70Cu-30Ni tubes was investigated in flowing seawater. A compact corrosion product film was formed on 70/30 cupronickel alloy with surface roughness (Ra=2.38μm) after immersion in flowing seawater for 28 days. As the surface roughness decreased to 0.242 μm, local defects were found in the corrosion product film. The 70/30 cupronickel specimens with high surface roughness showed higher corrosion resistance.X-ray photoelectron spectroscopy analysis revealed that that the inner layer of corrosion product film is rich in copper, nickel and iron than the out layer. It was found that the 70/30 cupronickel specimen with high surface roughness consisted of a Fe-rich in the corrosion product film. Results showed that the 70/30 cupronickel tube with rough surface prepared by sand blasting technology was helpful to the combination of corrosion product film and the substrate.

Keywords 70/30 cupronickel alloy, Surface roughness, Erosion-corrosion, Corrosion behavior, XPS