Comparative Study on the Corrosion Behaviours of High-Silicon Chromium Iron and Q235 Steel in a Soil Solution

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High-silicon chromium iron (HSCI) has been applied in grounding grids for some DC converter stations. However, there is a lack of experimental studies on its corrosion behaviour in a soil environment. In this paper, the corrosion behaviours of HSCI and Q235 steel in a soil solution were studied by optical microscopy, electrochemical measurements, SEM/EDS and 3D ultra-depth microscopy. The results show that the anode and cathode polarization branches of HSCI and Q235 steel are mainly dominated by electrochemical polarization. The corrosion resistance of HSCI is much better than that of Q235 steel in the soil solution. The high content of Cr and Si is beneficial for the high corrosion resistance of HSCI; however, the original defects in HSCI promote its corrosion process. Therefore, the reduction of number of the original defects may be conducive to further improving the corrosion resistance of HSCI.

Keywords: High-silicon chromium iron (HSCI); Q235 steel; electrochemical impedance spectroscopy (EIS); polarization curve

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