Study of the pitting corrosion at welding joints of Inconel 625 alloy under high temperature and high H₂S/CO₂ partial pressure

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The corrosion resistances of the Incoloy 825 alloy base metal and the Inconel 625 alloy weld under high temperature high pressure (HTHP) H₂S/CO₂ conditions were investigated. Pitting was only presented on the Inconel 625 alloy weld, even though it contains more corrosion-resistant elements than the Incoloy 825 alloy. Laves and G phases were found in the 625 alloy weld, which were confirmed to possess a lower corrosion resistance than the matrix using scanning Kelvin probe force microscopy. The changes in the semiconductor structure of the passive films were analysed through the Mott–Schottky curves after the HTHP H₂S/CO₂ corrosion. Finally, the pitting mechanism of Inconel 625 weld was discussed.

Keywords: G phase, Laves phase, Mott–Schottky plot, Pitting corrosion, H₂S/CO₂ corrosion

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