Short Communication

The Inhibition Effect Mechanism of Pyrazole on Cobalt Corrosion in Alkaline Solution

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In order to protect cobalt from corrosion, finding an effective inhibitor is a focus of studies. In this paper, the inhibition effect and mechanism of pyrazole on cobalt corrosion was investigated by state etch rate (SER) test, potentiodynamic polarization measurement and DFT calculation. The results of SER and potentiodynamic polarization experiments both exhibited the similar corrosion and inhibition characteristics of pyrazole for cobalt: the corrosion of cobalt was inhibited at high concentration of pyrazole, but was accelerated at low concentrations in the citric-hydrogen peroxide system with a pH of 10.5. Meanwhile, the conclusion can also be drawn that pyrazole is a mixed and relatively weak inhibitor for cobalt. Then the mechanism of pyrazole was further explored. Pyrazole exists mainly in molecular form in alkaline solution. The DFT calculation results indicate that on cobalt surface, the adsorption structure of vertical pyrazole molecule via nitrogen atom N2 site is the easiest and most stable. The inhibitory effect stems from the adsorption of the passivation film formed by hydrogen bonds between pyrazole molecules on the cobalt surface.

Keywords: pyrazole, inhibitor, cobalt, electrochemical, DFT calculation

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