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反应堆工程

C-276合金在650 ℃/25 MPa超临界水中的腐蚀行为

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摘要 研究了Hastelloy C-276（C-276）镍基合金在650 ℃/25 MPa超临界水中的腐蚀特性。采用扫描电镜、X射线能谱仪、X射线衍射和X射线光电子能谱分析了氧化膜的腐蚀形貌、组织结构和合金元素分布。研究结果表明，C-276合金在650 ℃/25 MPa的超临界水中的腐蚀过程主要是Ni的溶解，由于不能形成均匀、完整的氧化膜，合金在超临界水中并不具备优越的耐腐蚀性能，其双层结构的氧化膜富Cr而贫Ni、Mo，外层疏松的大颗粒（$Ni(OH)_2$和NiO）为金属溶解和氧化物沉淀形成，内层（Cr_2O_3）的生长则是水穿过氧化物微孔作用的结果。

关键词 Hastelloy C-276 镍基合金 超临界水 氧化膜

分类号

Corrosion Behavior of C-276 Alloy in Supercritical Water at 650 ℃/25 MPa

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Abstract

The corrosion behavior of nickelbase alloy Hastelloy C-276 was investigated in supercritical water (SCW) at 650 ℃/25 MPa. SEM, EDS, GIXRD and XPS were used to analyze the corrosion morphology, structure and element distribution of oxide film. The results show that the corrosion process of C-276 alloy at 650 ℃/25 MPa in SCW is mainly dissolution of Ni. Since it can not form a uniform and complete oxide film, the alloy in SCW is not well placed to corrosion resistance. The dual-layer oxide film structure which is formed on C-276 is rich in Cr but poor in Ni, Mo. The outer -layer consisting of loose and large grains $Ni(OH)_2$ and NiO agrees with dissolution and precipitation mechanism, while the growth of the Cr_2O_3 inner layer is the result of water through the porous oxides.

Key words Hastelloy C-276 nickel-base alloy supercritical water _ oxide film

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