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研究报告

合金元素对新型Co-Al-W合金热腐蚀行为的影响

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摘要： 研究了由γ′-Co_3(Al,W)相沉淀强化的新型钴基Co-Al-W 高温合金在800℃、75% Na_2SO_4+25% NaCl熔盐中的热腐蚀动力学及合金元素Mo、Nb、Ta和Ti对合金热腐蚀行为的影响。研究发现，2Mo、2Nb、 2Ta和2Ti合金比9.8W合金具有更好的抗热腐蚀能力，Mo和Ti对提高合金耐热腐蚀能力的效果比Ta和Nb显著。加入合金元素的合金热腐蚀膜由三层组成，即主要由Co氧化物CoO和Co_3O_4组成的腐蚀膜外层，由合金元素、Al、 Co及W复杂氧化物组成的中间过渡层和由Al、Co氧化物组成的腐蚀膜内层。随着腐蚀时间的增加，中间过渡层厚度逐渐增加，热腐蚀膜内、外层厚度变化不大，但内层致密性逐渐增加。

关键词： Co-Al-W合金 合金元素 热腐蚀

EFFECT OF ALLOYING ELEMENTS TO HOT CORROSION BEHAVIOR OF NOVEL Co-Al-W SUPERALLOY

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Abstract: Co-Al-W alloy is a kind of novel Co-based superalloy strengthened by ternary compound γ′-Co_3(Al,W) phase with the precipitation strengthening on γ-Co matrix. The paper studies the kinetic of hot corrosion of Co-Al-W superalloy at 800℃ in 75% Na_2SO_4+25\% NaCl molten salt and the effect on hot corrosion behavior of Co-Al-W alloy with alloying elements of Mo, Nb, Ta and Ti. The results show that the alloy of 2Mo, 2Nb, 2Ta and 2Ti have the superior anti-hot corrosion ability compared to 9.8W alloy. The anti-hot corrosion ability of Co-Al-W alloy with alloying elements Ta and Nb are inferior to Co-Al-W alloy adding Mo and Ti elements. The hot corrosion oxide scale with alloying elements of Mo, Nb, Ta and Ti is still made up of three layers, that is the external corrosion layer consists of Co oxide CoO and Co_3O_4, the intermediate mixed oxides layer composed of complex oxide and nonuniform oxide layer of alloying elements, Co, Al, W and an internal attacked layer with different compounds of Co, Al and O. With the increasing of corrosion times, the intermediate mixed oxides layer becomes thicker, the thickness of internal and external layer almost has no change, but compactness of internal layer is gradually increased.

Keywords: Co-Al-W superalloys alloying elements hot corrosion

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