Short Communication

Cold rolled 304 stainless steel and its interaction with liquid Sn

Chuang-dong Zhang, Yan Zhao*, Jian-jun Guan, Rong-hua Li, Feng Liu, Ping Liang

School of Mechanical Engineering, Liaoning Shihua University, Fushun 113001, Liaoning, China

*E-mail: zhaoyan-a@163.com

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The effect of strain-induced α' -martensite transformation and subsequent solution treatment on the interaction between stainless steel and liquid metal Sn was investigated. Liquid metal corrosion and electrochemical corrosion behavior was evaluated. A cold rolling (CR) treatment was performed to induce different amounts of α' -martensite. The reduction ratio of 36%, 55%, and 78% was used, and solution treatment (ST) was carried out. The phase structure of the stainless steels was examined by XRD, and the morphology and composition of the compound were formed by SEM and EDX. The results show that the cold rolling deformation leads to a large amount of α' -martensite transformation, and the solution treatment causes some martensite return to austenite. The deformed stainless steel interacts with liquid Sn, forming a (Fe,Cr)Sn₂ phase compound layer. The amount of deformation increases, the fine needle-like compound gradually increases, while the compound of the lath-like morphology gradually decreases. After the solution treatment, the fine needle-like compound returns to the lath-like morphology. The cold rolling treatment induces the α' -martensitic transformation, resulting in a significant change in the growth the Fe-Sn compound. At the low deformations of 36% and 55%, the cold rolling is found to decrease the pitting potential, and deteriorates the electrochemical corrosion behavior of stainless steel. At the deformation of 78%, the pitting corrosion resistance is increased, and the compound thickness expresses a small change.

Keywords: Cold rolling, Austenitic stainless steel, Strain induced martensite, Electrochemical corrosion, Liquid metal corrosion

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