The Surface Structure and Corrosion Resistance of ZrO₂-Doped Silane Film on Cold-Rolled Steels

Xingrui Zheng¹, Jiayi Li¹, Hao Yang¹, Yiqi Cui^{2,3,*}

¹ City college, Kunming University of Science and Technology, Kunming 650093, China;

² Faculty of Land Resource Engineering, Kunming University of Science and Technology, Kunming 650093, China;

³ Yunnan Province Engineering Research Center for Reutilization of Metal Tailings Resources, Kunming 650093, China.

*E-mail: kmust_cyq@163.com

doi: 10.20964/2020.05.36

Received: 15 August 2019 / Accepted: 2 February 2020 / Published: 10 April 2020

A novel green fluorozirconic acid-based conversion film on cold-rolled steels was proposed in this work. Various methods were used to determine the surface structure and the corrosion behavior of the film. Compared with the corrosion current of the silane film, the corrosion current of this film was reduced by 10% and the film provided satisfactory corrosion resistance in 5% NaCl solution. In addition, the stability of the conversion film was 38.5% higher than that of the silane film. This resulted from a Si-O-Zr bond, formed between the materials and the metal matrix, which yielded considerable improvement in the corrosion resistance of the cold-rolled steels. Therefore, this study constitutes a clear advance in the properties of conversion films on cold-rolled steels.

Keywords: sol-gel method; fluorozirconic; conversion film; corrosion resistance; cold-rolled steels

[FULL TEXT](#)

© 2020 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).