Influence of Cu Content on Microstructure and Corrosion Behavior of Flux-Cored Arc-Welded Metal with 10CrNi3MoV Steel

Jianglong Yi^{1,*}, Ben Niu¹, Rui Chen³, Yu Wang^{1,2}, Kai Wang^{2,**}, Yaoyong Yi¹

¹ Guangdong Provincial Key Laboratory of Advanced Welding Technology, Guangdong Welding Institute (China-Ukraine E. O. Paton Institute of Welding), Guangzhou, Guangdong, 510650, PR China

² Foshan University, Foshan, Guangdong, 528000, PR China

³ Hefei BOE Vision-electronic Technology Co.,Ltd, Hefei, Anhui, 230012, PR China

*E-mail: Yijl@gwi.gd.cn

**E-mail: hfutwk927@fosu.edu.cn

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This study aimed to investigate the effects of Cu addition on the properties of the 10CrNi3MoV steel weld metals prepared in the laboratory according to the flux-cored arc welding (FCAW) method. Specifically, the 10CrNi3MoV steel FCAW joints had been fabricated based on the as-prepared flux-cored wires after adding various Cu contents under the M21 mixed gas protection environment. Subsequently, the relationships of the micro-structural factors with the mechanical properties and corrosion behavior of the weld metal were examined through the metallographic, mechanical, EIS and SVET methods using the specimens cut transversely to the weld beads. Our research results had suggested that the addition of appropriate amount of Cu contributed to refining the grain size and improving the mechanical properties of the weld metals. Besides, it could also enhance the corrosion resistance of the FCAW welded metals, as verified through the conventional EIS and the localized microelectrodes (SVET) measurement.

Keywords: HSLA steel, Microstructure, Potentiodynamic polarization, Electrochemical impedance spectroscopy, Scanning vibrating electrode technique

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