Microstructure and Corrosion behavior of Friction Stir-Welded AZ31 alloy

Yao Yao^{1,2}, Jiabin Tang¹, Tianqi Chen¹, Zhifeng Wang², Hui Yu², Changxing Zhou²,
Hanqing Xiong^{1,2,3,*}

¹ Department of Mechanical and Electronic Engineering, Changsha University, Changsha 410022, China

² Hunan Joinfront Welding Technology Co., Ltd., Zhuzhou 412000, China

³ School of Materials Science and Engineering, Hebei University of Technology, Tianjin 300130, China

*E-mail: xhanqing@163.com

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Microstructure and corrosion behavior in stir zone (SZ), thermo-mechanically affected zone (TMAZ), heat affected zone (HAZ) and base material (BM) of friction stir welded (FSWed) AZ31 alloy are investigated in this study. Results indicate that the four zones show microstructure evolution due to localized heat and plastic deformation during FSW process. Electrochemical measurements and immersion test demonstrate that the TMAZ presents lower corrosion resistance because of non-uniform microstructure. Furthermore, the HAZ is influenced by heat flow leading to the stress release. Although the HAZ exhibits coarse grains, the distribution of grain size is relatively homogenous. Thus, the HAZ displays the low corrosion current density, the low corrosion rate and the high Impedance value, possesses better corrosion resistance.

Keywords: Mg alloy; Friction stir welding; Microstructure; Electrochemical property; Corrosion behavior

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