Effect of Ca-Mg microalloying on corrosion behavior and corrosion resistance of low alloy steel in the marine atmospheric environment

Chao Liu[1, 2*], Zaihao Jiang[1, 2], Xuequn Cheng[1, 2], Xiaogang Li[1, 2]

[1]*Key Laboratory for Corrosion and Protection of the Ministry of Education, Institute of Advanced Materials & Technology, University of Science and Technology Beijing, Beijing, China*

[2]*National Materials Corrosion and Protection Data Center, University of Science and Technology Beijing, Beijing, China*

[*]*Corresponding author*

Presenter's e-mail address: liuchaoustb@163.com

Abstract:

The effect of Ca-Mg microalloying on corrosion behavior of Al deoxidized low alloy steel in the simulated tropical marine atmospheric environments was investigated. The addition improves microstructural characteristics, increasing the corrosion potential by 70±10 mV and decreasing the corrosion rate from 1.66 mm/y to 1.57 mm/y over time. Furthermore, the addition of Ca-Mg has been observed to modify the morphological attributes, population density, dimensional parameters, and electrochemical properties of the prevalent inclusions. This modification is instrumental in shifting the underlying mechanisms that contribute to localized corrosion, which is often precipitated by these inclusions in the steel matrix.

Keywords: Inclusions; Localized corrosion; Low alloy steel; Corrosion resistance; Ca-Mg microalloying.