

## Corrosion behavior of X80 pipeline steel welded joints in 3.5 wt% NaCl solution

**Shipeng Zhang**, Songmei Li, Jianhua Liu ,Mei Yu\*

<sup>1</sup>Beihang University, Beijing, China

[zhangshipeng@buaa.edu.cn](mailto:zhangshipeng@buaa.edu.cn)

**Abstract** The welded joint of seawater pipeline is a non-uniform structure composed of base metal (BM), weld metal (WM) and heat affected zone (HAZ). Local heating and rapid cooling in the welding process will produce phase change stress, resulting in a large change in the internal corrosion sensitivity of welded joints<sup>[1, 2]</sup>. In this paper, the corrosion behavior of X80 pipeline steel welded joints in 3.5 wt% NaCl solution was studied through electrochemical measurements, SEM/EDS and 3D ultra-depth microscopy. The results show that uniform corrosion occurs on the surfaces of the three areas, and the corrosion degree of HAZ is more serious than that of BM and WM. In the process of separation immersion, HAZ samples have higher corrosion current density and more serious corrosion impact, and the corrosion rate of HAZ samples is always higher than that of BM and WM samples. Corrosion holes are observed in the HAZ region around the M/A component in the granular bainite region, and the reason for the accelerated corrosion may be that the M/A component will increase the galvanic effect<sup>[3]</sup>. With the extension of soaking time, the variation trend of  $R_{ct}$  in the three regions is basically the same, showing a trend of first decreasing, then increasing and finally decreasing, which is speculated to be related to the decomposition and accumulation of corrosion products<sup>[4]</sup>.

**Keywords** Corrosion behavior, X80 pipeline steel, Welded joints, Seawater corrosion

### Reference

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