On the role of Te-RE alloying on the passive film and pitting corrosion behavior of 316L stainless steel

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Abstract This work reports the mechanism of corrosion resistance enhancement of 316L stainless steel after Te-RE alloying. The individual MnS inclusions are replaced by composite inclusions, resulting in a reduced risk of pitting corrosion. The Volta potential difference between the matrix and Te/La-containing inclusions is decreased, leading to improved stability of the inclusions. After the RE-Te composite treatment, the stainless steel exhibits the largest pitting potential and the strongest corrosion resistance. Te increases the content of Mo and Cr in the passive film and generates TeO_2, which improves the densification of the passive film. La promoted the enrichment of Cr and Te in the passive film.

Keywords Stainless steel; Inclusion; Passive film; Pitting corrosion.