

## Mitigation effects of ammonium on microbiologically influenced corrosion of 90/10 copper-nickel alloy caused by *Pseudomonas aeruginosa*

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**Abstract** With the continuous growth of the global economy and increasing attention to marine resources, the development and breakthrough of marine engineering materials have become crucial for human exploration of the marine. Copper-nickel (Cu-Ni) alloys are extensively applied in critical components such as seawater intake pipes, seawater pumps, and seawater coolers, ensuring the efficient operation of engineering facilities<sup>[1]</sup>. However, Cu-Ni alloys face various types of corrosion challenges in marine environments, particularly the issue of corrosion perforation which is not uncommon. Once the piping system of equipment ruptures due to corrosion, it poses a serious threat to the safety of personnel on board. Therefore, studying the corrosion behavior of Cu-Ni alloys in marine environments holds significant importance.

This paper concentrated on the multifactor-coupled corrosion mechanisms of Cu-Ni alloy pipelines in marine environments under actual operating conditions. Our group employed exogenous redox electron mediators and energy starvation experiments to investigate the microbial corrosion mechanism of Ni induced by *Pseudomonas aeruginosa*, which belongs to the EET-MIC mechanism<sup>[2]</sup>. The MIC behavior of Cu-Ni alloy is found to be more intricate when compared to pure nickel. Recent years have seen a notable increase in nitrogen content in seawater due to the impact of marine pollutants, surpassing levels found in natural seawater. Consequently, we further explored the influence of ammonium presence in the microbial culture medium on the susceptibility of Cu-Ni alloy to MIC. This work revealed that *Pseudomonas aeruginosa* and ammonium exhibit an antagonistic effect, mitigated the MIC process of Cu-Ni alloy<sup>[3]</sup>. At the same time, we proposed a schematic diagram of the mechanism of ammonium to mitigate the microbial corrosion of Cu-Ni alloy caused by *Pseudomonas aeruginosa*.

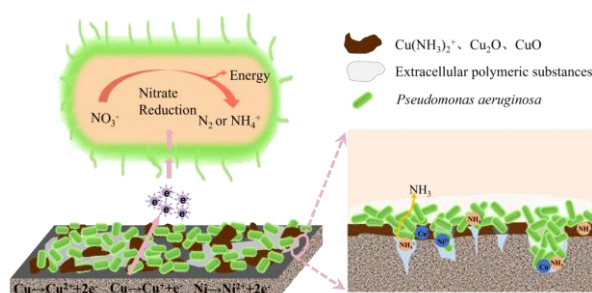


Fig. 1 Schematic diagram of the mechanism of ammonium to mitigate *Pseudomonas aeruginosa* induced microbial corrosion of Cu-Ni alloy

**Keywords** : Cu-Ni alloys; microbial corrosion; *Pseudomonas aeruginosa*

**Reference**

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