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EDITORIAL
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Editorial: Advances in Materials Toward Anti-Corrosion and Anti-Biofoulings

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Editorial on the Research Topic

Advances in Materials Toward Anti-Corrosion and Anti-Biofoulings

Corrosion and biofoulings are intractable problems triggered by complex chemical/electrochemical/hybrid interactions between materials and surrounding environments (Hou et al., 2017; Zhang and Xu, 2021), threatening a variety of fields such as marine engineering facilities, port wharfs, offshore platforms, coastal structures, chemical industries, and military equipment. In the past decades, great efforts have been devoted to design novel materials for enhancement of anti-corrosion and anti-biofouling performance, including corrosion inhibitors (Jain et al., 2020; Bhardwaj et al., 2021), organic/inorganic/nano-composite/waterborne protective coatings (Hosseinpour et al., 2021; Lazorenko et al., 2021), surface/coatings construction with special wettability (Zhang et al., 2021; Zhang et al., 2022) *etc*. This Research Topic collected 11 original research papers from 65 contributors of the relevant fields, presenting latest advances of corrosion/biofouling mechanism and novel anti-corrosion and anti-biofouling materials including crevice corrosion, microbiologically influenced corrosion (MIC), hydrogen permeation, corrosion inhibitors, organic anti-corrosion coatings, superhydrophobic coating, pH-responsive coating, and waterborne epoxy coating.

For advances of corrosion and biofouling mechanisms, Wang et al. investigated crevice corrosion behaviors of a typical pearlitic high-speed rail steel U75V based on a visualized *In situ* monitoring system, providing important information regarding the effect of pearlitic microstructure refinement on crevice corrosion. Li et al. used carbon source starvation to vary the sulfate-reducing bacterium (SRB)-elevated MIC severity for investigating subsequent MIC impacts on deterioration of the mechanical properties of X80 carbon steel. Zhang et al. investigated and estimated the hydrogen permeation behavior (hydrogen permeation efficiency and hydrogen embrittlement) of carbon steel during corrosion in highly pressed saturated bentonite by electrochemical and extrapolation analyses. Yu et al. investigated the corrosion behavior of Ti6Al4V alloy in the Presence of HCl through surface analysis and electrochemical measurements, presenting novel and useful information of the temperature-dependence corrosion mechanism for Ti corrosion-related failures.

For advances of anti-corrosion and anti-biofouling materials, Cao et al. experimentally and theoretically studied the effective inhibition properties of imidazo (Hou et al., 2017; Zhang and Xu, 2021) pyrimidine derivatives (namely, 2,4-diphenylbenzo (Jain et al., 2020; Lazorenko et al., 2021)imidazo (Hou et al., 2017; Zhang and Xu, 2021)pyrimidine and 2-(4-octylphenyl)-4-phenylbenzo (Jain et al., 2020; Lazorenko et al., 2021)imidazo (Hou et al., 2017; Zhang and Xu, 2021)pyrimidine) as corrosion inhibitors

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against mild steel corrosion in HCl solution. Guo et al. studied the corrosion inhibition effect of 3-amino-5-mercapto-1,2,4-triazole (AMT) inhibitor on AA2024 aluminium alloy in 3.5 wt% NaCl solution, indicating that the efficient adsorption of corrosion inhibitor molecules significantly enhanced the anti-corrosion performance. Guo et al. prepared a graphene modified epoxy surface tolerant coating on rusty carbon steel substrate, then studied its corrosion resistant performance and phytic acid-rust conversion mechanism. Minhas et al. developed a novel active protective surface based on epoxy coating and underlying lithium carbonate (Li_2CO_3)-treated anodized aluminum alloy 2024-T3. Zhang et al. fabricated an eco-friendly and mechanical robust superhydrophobic coating with low adhesion force, superior corrosion resistance and easy adaptability based on fluorine-free chemical reagents. Furthermore, the deliquescence behaviors of NaCl salt particles and the instantaneous self-coalescence phenomenon were recorded under high atmospheric humidity, demonstrating a promising marine atmospheric anti-corrosion utilizations. Hao et al. reported the design and fabrication of pH-controlled releasing behaviors of polydopamine/tannic acid-allicin@chitosan (PDA/TA-ALL@CS) multilayer coatings to realize antibacterial and antifouling effects in marine environments. Zhou et al. developed a simple and effective method to prepare graphene oxide (GO) hybridized waterborne epoxy (GOWE) coating to simultaneously improve anti-corrosion and anti-bacterial functions, which provides new insight into the multifunctional marine applications of polymer composite coatings based on 2D nano-materials.

Although some significant progress has been achieved in this Research Topic, many challenges remain for improving the long-term durability, environmental sustainability, easy applicability *etc*. As guest editors, we hope the 11 original research papers collected in this Research Topic can provide the readers with some new insights and perspectives for the design and development of advanced anti-corrosion and anti-biofouling materials.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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