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Editorial: Marine science and materials surfaces

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Editorial on the Research Topic
Marine science and materials surfaces

Oceans are attracting attention as frontiers of natural resources. The development of natural resources began in 1947 with the extraction of crude oil from the Gulf of Mexico (American Oil & Gas Historical Society, 2023). Mining of natural resources has expanded to include methane hydrates and rare metals. Mining of these natural resources requires equipment that can withstand the high salinity of seawater, hydrothermal fluids, and high-pressure environments. In addition, the effects of biofouling caused by marine organisms on the equipment must be considered. Biofouling is a dynamic biological process that occurs on material surfaces, ranging from biofilm formation to the attachment and growth of large marine organisms such as shellfish and seaweed. Although ocean development is important, marine conservation is also a crucial problem, such as decontaminating marine pollution from microplastics and refining wastewater from economic activities. Manmade materials are involved in both aspects, and we should understand the characteristics and behaviour of these materials in the marine environment to strike a balance between oceanic preservation and its sustainable development. This Research Topic is featured influence of manmade materials on the oceanic environment. The materials discussed here range from marine structures, industrial products used in the mining and harbingering of marine resources, and marine pollutants including microplastics.

Kim et al. focused on discharged polycyclic aromatic hydrocarbons (PAHs) in scrubber wash water and proposed a method to degrade them using liquid phase plasma (LPP). In the LPP method, active chemical species (oxygen and hydroxide radicals) are generated to chemically attack and degrade the discharged PAHs. The use of LPP system is an effective scrubber wash water treatment method because LPP can process it in a short time without any chemical agents, and can be applied for various types of discharged PAHs to be decomposed.

Wu et al. have reported a rapid and efficient method for evaluating the magnitude of wave effects on the connector portion of a column pontoon very large floating structure (CP-VLFS) based on a temporal hydrodynamic constraint. The CP-VLFS plays an important role as an offshore structure for natural exploration and mining, and the mechanical loading on the connectors of the VLFS is considered to be significant.

Therefore, the evaluation method they have established provides a proper understanding of the hydrodynamic properties of the CP-VLFS (and connectors) against waves, leading to the development of materials that are more suitable for the maritime environment.

Zhu et al. have proposed a grading model for methane hydrate reserves in the Qiongdongnan Basin of the South China Sea. The proposed model employs K-means clustering and Adaboost method based on logging data from pilot-scale mining with Schlumberger measuring tools, and the grading accuracy reached 95%. The study also found that methane hydrate reserves are related to clay content, porosity and average grain size, providing useful information for full-scale mining and utilisation of methane hydrates.

Seo et al. reported on the corrosion behaviour of gas tungsten arc welded (GTAW) super austenitic stainless steel, assuming a ship made of corrosion resistant desulphurised material. Austenitic stainless steels have excellent corrosion resistance. They compared the corrosion behaviours of ERNiCrMo-3 and ERNiCrMo-4 as filler metals in the weld zone and found that the corrosion resistance of ERNiCrMo-4 was higher than that of ERNiCrMo-3. They found that the choice of filler metal is important in maintaining the corrosion resistance of super austenitic stainless steel.

Freitas et al. reported on the selection of plastics suitable for oyster farming by means of an antifouling performance evaluation over a period of four months under actual aquaculture conditions. They used four types of plastics of different materials and colours and placed a net made of each material on the shore of the bay. The results show the relationship between environmental factors and the fouling performance.

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AO: Writing – original draft, Writing – review & editing. S-HL: Writing – review & editing. HK: Writing – review & editing. M-HL: Writing – review & editing.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Reference

American Oil & Gas Historical Society (2023) *Offshore Drilling History*. Available online at: https://aoghs.org/topics/offshore-history/ (Accessed February 20, 2024).