Submerged and completely open solid-liquid triboelectric nanogenerator for electrochemical corrosion protection

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Abstract Metal corrosion seriously affects the service life of marine steel structures. Cathodic protection is an important method to extend the service life of metals. However, traditional cathodic protection needs great consumption of energy and metal resources, which exacerbates global energy problems and environmental crises. Clean energy are particularly important for sustainable development. Therefore, it is imperative to develop green and cost-effective energy sources for corrosion protection. Recently, triboelectric nanogenerators (TENGs) have attracted the attention of researchers as a new energy conversion system. TENGs provides a convenient energy source for realizing the electrochemical corrosion protection.

Here, a submerged and completely open solid-liquid TENG (SOSL-TENG) is developed for ocean wave energy harvesting. SOSL-TENG is adapted to various water environments. Due to its simple structure, it is easy to deploy into various marine engineering facilities in service. Four TENGs units were integrated and fixed in a wave tank to simulate the TENG network capturing wave energy. SOSL-TENG network can harvest wave energy to provide electricity for electrochemical corrosion protection. The results indicate that the protected potential of Q235 can be continuously maintained at around -1V. This work provides a prospective strategy for large-scale deployment of TENG applications, especially for harvesting wave energy in spray splash zones or at the surface of the water to electrochemical corrosion protection.

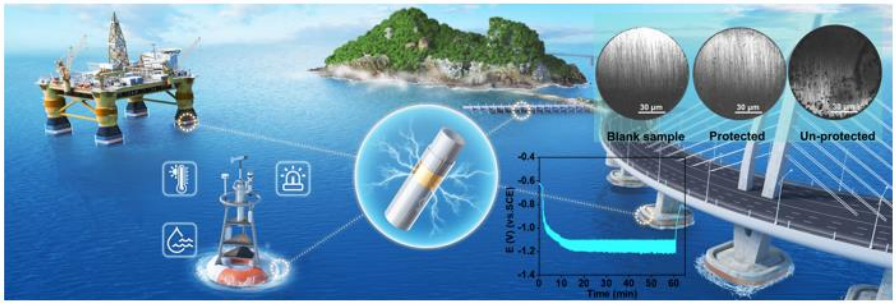

Fig.1 SOSL-TENG electrochemical corrosion protection system

Keywords Triboelectric nanogenerators, Metal corrosion, Electrochemical corrosion protection

Reference

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[2] Youbo Nan, Xiutong Wang *, Hui Xu, Hui Zhou, Yanan Sun, Mingxing Wang, Weilong Liu, Chaoqun Ma, Teng Yu, Submerged and completely open solid-liquid triboelectric nanogenerator for water wave energy harvesting, InfoMat, 2024, 2567-3165, INF212621