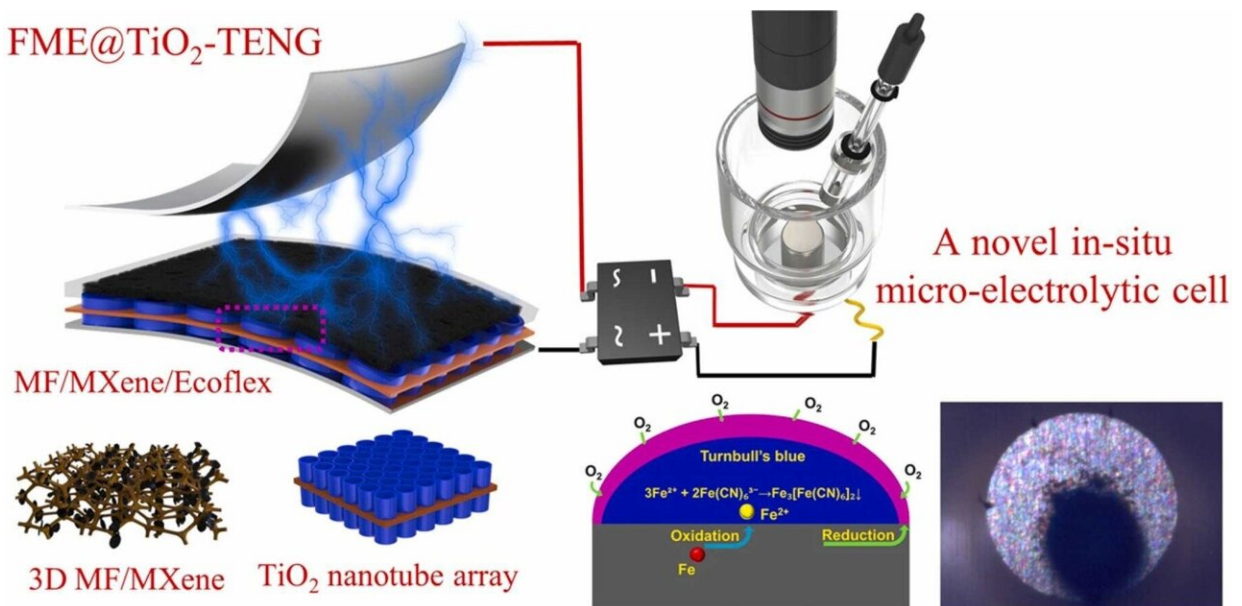


Using green energy for electrochemical corrosion protection

April 4 2023, by Li Yuan



Graphical abstract. Credit: *Nano Energy* (2023). DOI: 10.1016/j.nanoen.2023.108345

Metal corrosion seriously affects the service life of marine steel structures. The traditional cathodic protection needs great consumption of energy and metal resources. Therefore, it's imperative to develop green and cost-effective energy sources for corrosion protection.

Recently, a research team led by Prof. Wang Xiutong from the Institute

of Oceanology of the Chinese Academy of Sciences (IOCAS) focused on [triboelectric nanogenerators](#) (TENGs) as a new energy conversion system, and designed melamine foam (MF) /MXene/Ecoflex@TiO₂-TENG (FME@TiO₂-TENG) for green electrochemical corrosion protection.

The study was published in *Nano Energy* on March 13.

The researchers explored the effects of MXene and TiO₂ nanotubes on the charge transfer mechanism of the friction layer. They found that the conductive properties and strong electronegativity of MXene played a positive role in the charge transfer of Ecoflex. At the same time, TiO₂ nanotubes could capture the image charge. The combined action of the above two points improved the electrical output performance of TENG, which is conducive to the formation of better cathodic protection effect.

In addition, the researchers evaluated FME@TiO₂-TENG cathodic protection effect with the help of micro-electrolytic cell system.

TENGs technology has the advantages of wide availability of materials, light weight, low cost and high efficiency of low-frequency energy conversion. "There are abundant mechanical energies available in the marine environment, such as [wind energy](#), [wave energy](#), tidal energy, etc., which provides a convenient energy source for corrosion protection using TENG," said Nan Youbo, first author of the study.

"This study demonstrates the potential of TENG as a green energy source for electrochemical cathodic protection, which would provide safety guarantee for the structures and equipment in [marine environment](#)," said Prof. Wang.

More information: Youbo Nan et al, Synergistic effects of charge transport and trapping in tribomaterials for boosted triboelectric

nanogenerators, *Nano Energy* (2023). DOI:
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