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Multiscale Microdevices with Nanopillars for Antibiofouling Sensing and Drug Delivery

A device with nested multiscale features combines active and passive strategies for over ten years of anti-biofouling protection on marine and implantable sensors.

Microscale sensors and drug delivery devices often suffer from functional degradation due to biofouling. Biofouling is one of the most recognized challenges in developing chronically functional devices for marine and implantable applications. This problem has been addressed by the use of coating; however, coatings lose functionality over time. Other passive antifouling mechanisms are often toxic, short-term solutions. A more reliable and long-lasting solution might improve the reliability and performance of implantable sensors and drug delivery devices.

Researchers at Purdue University have developed an antifouling solution for large, nonplanar optical surfaces. This technology is a device for marine or implantable applications that has nested multiscale features for active and passive anti-biofouling strategies. By combining active and passive anti-biofouling mechanisms, this device will provide long-term protection against biofouling for over 10 years, extending the lifetime of self-clearing marine or implantable sensors.

Advantages:

-Remove protein, bacteria, and cellular-level biofilms

-Extend lifetime of self-clearing marine/implantable sensors

-Insights on progression of various chronic diseases

Potential Applications:

-Marine/implantable sensors

-Neural interfaces

-Inflammation, restoration, and therapeutics

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