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Sandia National Laboratories

Biofouling Resistant Coatings for Water Power Devices

Extending device lifetimes and reducing maintenance costs with an environmentally-friendly coating

www.pci.uni-heidelberg.de

Sandia's non-toxic biofouling-resistant coatings already match the performance of existing toxic products.

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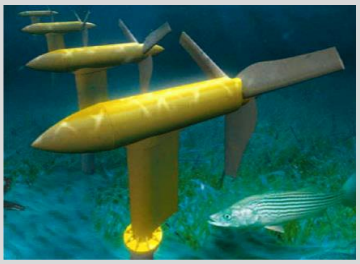
Problem Statement:

Coatings that prevent growth of unwanted organisms (bacteria, algae, and barnacles) on marine surfaces such as ship hauls, locks, and ports prevent billions of dollars in maintenance costs annually. These same coatings are now being adapted to marine hydrokinetic devices that harvest energy from waves and rivers. The active ingredients (tin- and copper-containing biocides) are environmentally toxic and have been outlawed in a number of places including in the North Atlantic. New environmentally benign coatings that prevent biofouling at equal or better cost and performance are needed.

Approach:

Sandia and our partners are developing biofouling-resistant coatings that do not rely on the release of toxins into the surrounding water. We have developed a suite of technologies that include antimicrobial peptide mimics and zwitterionic compounds that are bonded to surfaces through polysiloxane chemistry. These coatings can prevent biofouling by either killing single-celled organisms on contact, or by disrupting protein interactions that lead to bacterial colonization. The zwitterionic coatings in particular, are inspired by the membranes of blood cells and they prevent biofouling and ease the removal of foulants by creating large hydration layers. Our coatings have been applied to metal substrates for biofouling evaluation against both marine bacteria and microalgae. Sandia coatings perform similarly to commercial standards in biofouling prevention and are superior in ease of foulant removal, most notably in removal of microalgae.



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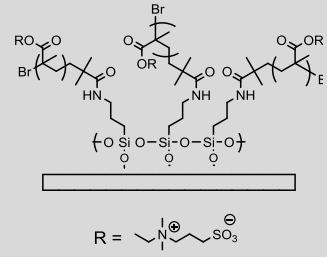

Impact:

The market for anti-microbial coatings in the US alone is projected to reach $1 billion by 2015. The development of environmentally-friendly biofouling resistant coatings will help to accelerate the commercialization of marine hydrokinetic devices by easing concerns over regulations issues.

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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