Marine Antifouling Peptide to Prevent Biofouling

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Fouling Deterrent Strategy to Defeat Barnacle Biofouling via Peptides.

Market Overview

This synthetic conopeptide analog, named Miata57, to the noradrenaline (NA) molecule enables antifouling action. This analog could potentially be manufactured and incorporated into commercial epoxy based paints and coatings to deter fouling marine invertebrates from settling, thus preventing biofouling. Marine coatings are used in commercial and military ships, fixed and floating marine structures, and recreational boats and yachts. Both Tributyl tin and copper based antifouling paints are highly toxic to the marine environment and tend to accumulate in the sediments of ports, harbors, and estuaries that host many ships. This creates a market need for safe and effective coatings that provide protection without harming the marine environment. In addition, the desire to reduce fuel consumption of ships is contributing to the growth of the marine coating market, which is expected to reach $10.2 million by 2018. In this superior market environment, Clemson University Researchers have developed, synthesized and tested co-polymer systems that have bioactive peptide Miata57 on their surfaces which inhibit the NA cellular transporter/receptor complex. This highly effective and safe antifouling peptide innovation could promote leadership in the field of protective, industrial, and marine coatings.

Technical Summary

Prior research has shown that NA, when covalently bound to a surface deters fouling marine invertebrates from settling, thus preventing biofouling. Yet, NA is not an ideal molecule for inclusion as an active agent in marine antifouling paints due to the fact that it has a short half-life and it spontaneously oxidizes into adenochrome, thus resulting in a complete loss of biological activity. This produced the need to find a molecular analog to the NA ligand that would have a long half-life and could be manufactured and incorporated into commercial epoxy based paints and coatings. The peptide Clemson developed stimulates apoptosis in hemocytes and cyprids. It is toxic to three day old cyprids and inhibits cyprids larval settlement at certain concentrations. The conopeptide based system is highly effective and shows stability in the marine environment.

Application

Marine coatings; commercial epoxy based coatings and paints

Development Stage

Validated Prototype

Advantages

- Uses peptides to create coatings, creating a highly effective, safe and environmentally benign solution for the antifouling industry
- Deters fouling marine invertebrates from settling, preventing biofouling and decreasing need for maintenance and repair of ocean ships
- Utilizes a synthetic NA analog, improving stability and ligand specificity of the peptide chain

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Utility	United States	62/165,345	NA	2015-066	Dr. Andrew Mount, Mary Beth Johnstone, Bin Chan

About the Inventor

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Dr. Andrew S. Mount earned his Ph.D. in zoology from Clemson University. Dr. Mount is the founder and director of the Okeanos Research Laboratory. He has authored and co-authored 65 publications, and published in prestigious journals like Science and Nature. His research interests include the application of modern marine genomics and bioinformatics to develop a bias free understanding of molluscan immunity and cellular biomineralization systems.

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