Antifouling technology-past, present and future steps towards efficient and environmentally friendly antifouling coatings - DTU Orbit (09/09/2019)

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The imminent ban of environmentally harmful tributyltin (TBT)-based paint products has been the cause of a major change in the antifouling paint industry. In the past decade, several tin-free products have reached the commercial market, and claimed their effectiveness as regards the prevention of marine biofouling on ships in an environmentally friendly manner. The main objective of this review is to describe these products in as much detail as possible based on the knowledge available in the open literature. This knowledge has been supplemented by means of performance data provided, upon request, by some of the paint-producing companies. An exhaustive review of the historical development of antifouling systems and a detailed characterisation of sea water are also included. The need for studies on the behaviour of chemically active paints under different sea water conditions is emphasised. In addition, the most common booster biocides used to replace TBT-containing compounds are listed and described. It must be stressed that there is still a lack of knowledge of their potential environmental side effects.

The current interest in providing innovative antifouling technologies based on an improved understanding of the biological principles of the biofouling process is also considered in this review. From the analysis of the factors affecting the biofouling process, the interference with the settlement and attachment mechanisms is the most promising environmentally benign option. This can be accomplished in two main ways: imitation of the natural antifouling processes and modification of the characteristics of the substrate. The former mostly focuses on the study of the large amount of secondary metabolites secreted by many different marine organisms to control the fouling on their surfaces. The many obstacles that need to be overcome for the success of this research are analysed. The potential development of broad-spectrum efficient coatings based on natural antifoulants is far from commercialisation. However, exploitation of a weakening of biofouling adhesion by means of the non-stick and fouling-release concepts is at a rather advanced stage of development. The main advantages and drawbacks of these systems are presented along with a brief introduction to their scientific basis. Finally, other alternatives, which may eventually give rise to an efficient and environmentally benign antifouling system, are outlined. (C) 2003 Elsevier B.V. All rights reserved.

General information
Publication status: Published
Organisations: CHEC Research Centre, Department of Chemical and Biochemical Engineering
Contributors: Yebra, D. M., Kiil, S., Dam-Johansen, K.
Pages: 75-104
Publication date: Jul 2004
Peer-reviewed: Yes

Publication information
Journal: Progress in Organic Coatings
Volume: 50
Issue number: 2
ISSN (Print): 0300-9440
Ratings:
Scopus rating (2004): SJR 0.706 SNIP 1.105
Web of Science (2004): Indexed yes
Original language: English
Keywords: chemical product design, biofouling, antifouling paint, tin-free, biocides, fouling-release
DOIs: 10.1016/j.porgcoat.2003.06.001
Source: orbit
Source ID: 116866
Research output: Contribution to journal › Review – Annual report year: 2004 › Research › peer-review