WO 2013/000477 A discloses a cured fouling control coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of the coat, and one or more enzymes. It is disclosed that the coat may further comprise one or more hydrophilic-modified polysiloxane oils; and that the binder matrix may have included as a part thereof hydrophilic oligomer/polymer moieties.

It is an object of embodiments of the invention to provide alternative multilayer polysiloxane-based fouling control coating systems for further improving the fouling control properties. Desired is also a coating system capable of tuning the biocide leaching rate to make it less dependent on time.

SUMMARY

It has been found by the present inventor(s) that this objective can be achieved by specifically designed fouling control coating systems.

Accordingly, the inventors of the present invention now surprisingly found that improved performance is achieved by a polysiloxane-based fouling control coating system comprising a reservoir of the active ingredients, wherein said reservoir is separated from the hydrophilic surface (i.e. high surface energy) of the coating. Accordingly, the fouling control coating system provided herein has a reservoir of active ingredients in a (first) polysiloxane-based layer which is placed underneath another polysiloxane-based layer. Essential for the fouling control properties are the hydrophilic oligomer/polymer moieties and/or hydrophilic-modified polysiloxane oils comprised in the coating system. Within the coating system provided herein, the active ingredient(s) diffuses(s) from the reservoir to the surface of the coating. Compared to conventional coatings, a more effective use of the active ingredient is achieved. Moreover, an improved controlled release of active ingredient from the reservoir to the seawater is achieved as compared to conventional coatings. This improved controlled release is even maintained over a prolonged time. The inventors of the present invention thus succeeded in inventing coating systems providing improved fouling control properties over prolonged time.Accordingly, in one aspect, the present invention refers to a fouling control coating system comprising at least a cured first coat and a cured second coat, a) said first coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said first coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts, said first coat further comprising one or more active ingredients selected from biocides; and b) said second coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said second coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts, wherein, c) said binder matrix of said first coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said first coat further comprising one or more hydrophilic-modified polysiloxane oils, or d) said binder matrix of said second coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said second coat further comprising one or more hydrophilic-modified polysiloxane oils wherein the hydrophilic oligomer/polymer moieties are pendant to said polysiloxane-based binder matrix. In one example, there is disclosed a fouling control coating system comprising at least a cured first coat and a cured second coat, wherein:

CLAIMS

1. A fouling control coating system comprising at least a cured first coat and a cured second coat,

a) said first coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said first coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts, said first coat further comprising one or more active ingredients selected from biocides; and

b) said second coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said second coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts,

wherein,

c) said binder matrix of said first coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said first coat further comprising one or more hydrophilic-modified polysiloxane oils, *or*

d) said binder matrix of said second coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said second coat further comprising one or more hydrophilic-modified polysiloxane oils

wherein the hydrophilic oligomer/polymer moieties are pendant to said polysiloxane-based binder matrix.

2. A fouling control coating system according to claim 1, wherein

said binder matrix of said first coat and/or of said second coat having included as a part thereof:

i. hydrophilic oligomer/polymer moieties, and/or

ii. one or more hydrophilic-modified polysiloxane oils.

3. A fouling control coating system according to any one of claims 1-2, wherein

said binder matrix of said second coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said second coat further comprising one or more hydrophilic-modified polysiloxane oils.

4. The fouling control coating system according to any one of the preceding claims, wherein said binder matrix of said second coat has included as a part thereof hydrophilic oligomer/polymer moieties.

5. The fouling control coating system according to any one of the preceding claims, wherein said second coat further comprises one or more hydrophilic-modified polysiloxane oils.

6. A fouling control coating system according to any one of claims 1-2 which comprises at least a cured first coat and a cured second coat,

a) said first coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said first coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts, said first coat further comprising one or more active ingredients selected from biocides;

b) said binder matrix of said first coat having included as a part thereof hydrophilic oligomer/polymer moieties, and/or said first coat further comprising one or more hydrophilic-modified polysiloxane oils; and

c) said second coat comprising a polysiloxane-based binder matrix constituting at least 40 % by dry weight of said second coat, and more than 50 % by weight of the binder matrix being represented by polysiloxane parts.

7. A method of establishing a fouling control coating system on a surface of a substrate, comprising the sequential steps of:

a) applying one or more layers of a polysiloxane-based coating composition onto the surface of said substrate, e.g. either a native substrate or a substrate already carrying one or more coatings, as the case may be, and allowing said layer(s) to cure, thereby forming a cured first coat as defined in any one of claims 1-6, and

b) applying one or more layers of a polysiloxane-based coating composition onto the surface of said cured first coat, and allowing said layer(s) to cure, thereby forming a cured second coat as defined in any one of claims 1-6, respectively.