Although block copolymers of siloxanes and polyurethane are known and, furthermore, the use of polyurethane as a matrix in a polymeric material comprising a polyorganosiloxane has been described in WO 2006/086092, this is the first disclosure of a composition for use in fouling release coating in which a polysiloxane and a silane terminated polyurethane are designed to co-cure.

Silane terminated polyurethanes are commercially available polymers and are described in, for example, US 5990257. As a result of their predominantly organic nature they are relatively compatible with epoxy primers and show good adhesion to such layers, as well as a variety of other substrates. The present invention represents an effective way in which to improve adhesion so that at least the link coat, and preferably also the tie coat can be eliminated from fouling release coating systems. The composition of the invention can also be applied to existing anti-fouling or fouling release coatings without having to apply a further link coat.

Summary

In one aspect, there is provided a multilayer fouling release coating comprising:

(I) a primer layer; and

(II) a layer comprising at least one polysiloxane and at least one silane terminated polyurethane. Preferably said layers are adjacent.

In another aspect, there is provided a multilayer fouling release coating comprising:

(I) a primer layer; and

(II) a layer comprising polysiloxane and at least one silane terminated polyurethane which have been cured. Preferably said layers are adjacent.

In another aspect, there is provided a composition for use in the manufacture of a fouling release coating, e.g. at least one layer of a fouling release coating, comprising at least one curable or crosslinkable polysiloxane and at least one silane terminated polyurethane.

In another aspect, there is provided use in the manufacture of a fouling release coating, e.g. at least one layer of a fouling release coating, of a composition comprising at least one curable or crosslinkable polysiloxane and at least one silane terminated polyurethane.

In another aspect, there is provided a fouling release coating comprising a layer comprising at least one polysiloxane and at least one silane terminated polyurethane.

The disclosure further provides a fouling release coating comprising a layer comprising at least one polysiloxane and at least one silane terminated polyurethane which have been cured.

In another aspect, there is provided an article such as a vessel comprising a cured fouling release coating as hereinbefore defined.

In another aspect, there is provided use of a cured fouling release composition as herein described to prevent or reduce fouling on articles submerged in sea water.

In another aspect, there is provided a process for the preparation of a fouling release coating comprising applying a layer comprising at least one curable or crosslinkable polysiloxane and at least one silane terminated polyurethane to a surface and allowing curing to occur.

In another aspect, there is provided a kit for use in the manufacture of at least one layer in a fouling release coating comprising:

(I) at least one curable or crosslinkable polysiloxane as a first part; and

(II) a catalyst component as a second part;

wherein either said first part or said second part additionally comprises at least one silane terminated polyurethane.

In another aspect, there is provided a kit for use in the manufacture of at least one layer in a fouling release coating comprising:

(I) at least one curable or crosslinkable polysiloxane as a first part;

(II) a catalyst as a second part; and

(III) a crosslinking agent as a third part;

wherein either said first part or said second part or said third part additionally comprises at least one silane terminated polyurethane.

Definitions

The term fouling release coating is used herein to define all layers making up the fouling release coating as a whole. The fouling relase coating of the invention will contain at least one layer formed by curing the at least one polysiloxane and at least one silane terminated polyurethane. Preferably it will be a multi-layered coating formed from:

(I) the primer layer, tie coat (comprising the silane terminated polyurethane (SPU)/polysiloxane as herein defined) and top coat; or

(II) primer layer and top coat (comprising the SPU/polysiloxane as herein defined).

Silane terminated polyurethanes are urethane polymers modified by end capping some or all of the isocyanate groups with organosilanes. It will be appreciated that the silane terminated polyurethane should be curable or crosslinkable.

The terms curable or crosslinkable are used interchangeably herein.

The term silanol terminated polysiloxane implies the presence of at least one OH at one or both ends of the polysiloxane. The term alkoxy terminated polysiloxane implies the presence of at least one alkoxy group at one or both ends of the polysiloxane, preferably all end groups are alkoxy.

Detailed Description

The composition for use in the fouling release coatings of the present invention comprises two key polymer components: at least one curable or crosslinkable polysiloxane and at least one silane terminated polyurethane.

Polysiloxane