POLYURETHANE BLOCK COPOLYMER CONTAINING ONE OR MORE POLYSILOXANE BLOCKS FOR MEMBRANES

~~Polyurethane block copolymer based on poly siloxane tenside for membranes~~

Description

The instant invention relates to novel polyurethane block copolymers based on poly siloxane(tensides) with anchoring units, their use as anti bio-adhesion additives especially in membrane preparation, and polymer membranes, especially for microfiltration, ultrafiltration or gas separation or purification purposes, containing the novel copolymers.

The problem of biofouling is pronounced in semipermeable membranes used for separation purposes like microfiltration, ultrafiltration or reverse osmosis. Membranes may be classified according to their pore dimension in most of the application profiles. For example, in water filtration applications ultra filtration membranes (approximate pore diameter: 100 – 1000 nm) are used for wastewater treatment retaining organic and bioorganic material. Much smaller diameters are required in desalination applications (reverse osmosis; approximate pore diameter 1 nm) for retaining ions. In these applications, the ambient medium is an aqueous phase, where potential blockage may occur by adhesion of micro-organisms and bio-film formation. In consequence, a membrane with anti-adhesion properties is desired, which would reduce bio-film formation and thus require less cleaning cycles.

US-5102547 proposes various methods for the incorporation of of oligodynamic materials including silver powders and silver colloids into membranes. US-6652751 compares several bacteriostatic membranes obtained after contacting polymer solutions containing a metal salt with a coagulation bath containing a reducing agent. Membranes containing certain modified polymers have also been proposed to improve fouling resistance; WO 09/098161 discloses certain alkoxyamine-functionalized polysulfones as additives for the purpose. WO 07/053163 recommends incorporation of certain graft-copolymers based on a polysiloxane backbone into polymeric materials such as coatings to impart antifouling properties. Hydrophobic properties of polysiloxanes have already been exploited to impart "fouling release" properties to surfaces coated by these polymers or by certain copolymers containing polysiloxane blocks (see S. Krishnan, J. Mater. Chem. 2008, 18, 3405, and references cited therein).

Certain block-copolymers with urethane linkage have now been found, which show especially advantageous antifouling properties. Due to their good compatibility, the present block-copolymers may be fully incorporated into other matrix polymers, or rigidly anchored in these matrices and enriched at the surface. Thus, the present block-copolymers may conveniently be used as an additive imparting antimicrobial and anti bioadhesion properties to polymeric articles and their surfaces, e.g. when incorporated into a membrane, especially a membrane for water filtration purposes. The present block-copolymers contain one or more polysiloxane blocks as diol component (B),