To improve water repellent performance, Patent Document 3 proposes a method of fixing a polymer containing a specific fluoroalkyl alcohol (meth)acrylic acid derivative in a part, a melamine resin, and a water-dispersible polyfunctional isocyanate crosslinker to fiber surfaces, through at least one of a sulfone group-containing compound or a polyphenol compound fixed to the fiber surfaces. This method achieves a low water retention rate, but the water repellent performance is lower than the fluorine-based water repellent agents containing PFOA with 8 or more carbon atoms when immersed in water for an extended time.

Prior Art Documents

Patent Documents

[0003] Patent Document 1: JP 2007-270374 A

Patent Document 2: JP 2010-150693 A

Patent Document 3: JP 2014-194098 A

Disclosure of Invention

Problem to be Solved by the Invention

[0004] As described above, the water repellency of conventional swimsuits is not satisfactory, and there have been demands for swimsuits with higher water repellency, lower water retention rate, and higher buoyancy.

Embodiments of the present invention provide a swimsuit having improved water repellency, water retention rate, and buoyancy.

Means for Solving Problem

[0005] ~~According to an aspect of the present invention, there is provided a swimsuit including an elastic polyurethane yarn. The elastic polyurethane yarn contains: 0.5 to 10% by mass (mass%) of a cationic high-molecular-weight compound A having a number-average molecular weight of 2000 or more; and an inorganic chlorine deterioration inhibitor B. The mass ratio of the cationic high-molecular-weight compound A to the inorganic chlorine deterioration inhibitor B ranges from 0.3 to 3, and a silicone oil is applied to the elastic polyurethane yarn. A fabric for the swimsuit is treated with water repellent finishing.~~

According to an aspect of the present invention, there is provided a swimsuit including an elastic polyurethane yarn, wherein the elastic polyurethane yarn includes: 0.5 to 10% by mass of a cationic high-molecular-weight compound A having a number-average molecular weight of 2000 to 10000; and an inorganic chlorine deterioration inhibitor B, a mass ratio of the cationic high-molecular-weight compound A to the inorganic chlorine deterioration inhibitor B ranges from 0.3 to 3, a silicone oil is applied to the elastic polyurethane yarn, a fabric for the swimsuit is treated with water repellent finishing, and a ratio of fluorine (F) to carbon (C) on the elastic

polyurethane yarn is 0.030 or more and 0.073 or less in an elemental mass concentration according to scanning electron microscope - energy dispersive X-ray spectroscopy (SEM-EDX), where the elemental mass concentration is measured by SEM-EDX using an elastic polyurethane yarn that is exposed on a surface of a dismantled fiber structure or an elastic polyurethane fiber that is taken out from an unraveled yarn, and the F/C ratio is calculated from the obtained elemental mass concentration.

Effect of the Invention

[0006] Embodiments of the present invention provide a swimsuit with high water repellency, a low water retention rate, and high buoyancy by improving the water repellency of the elastic polyurethane yarn itself. Such a swimsuit is advantageous for competitive swimmers to swim at high speed and for general swimmers to swim comfortably.

Brief Description of Drawings

[0007] [FIG. 1] FIG. 1 is a schematic plan view of a stretch woven fabric for a swimsuit according to one embodiment of the present invention in which a plain weave part and a weft double weave part are repeated alternately.

[FIG. 2] FIG. 2 is a schematic plan view of a stretch woven fabric for a swimsuit according to another embodiment of the present invention in which a plain weave part and a warp double weave part are repeated alternately.

[FIG. 3] FIG. 3A is a schematic plan view of the stretch woven fabric, and FIG. 3B is a cross-sectional view thereof.

[FIG. 4] FIG. 4A is a schematic plan view of a covered yarn for the stretch woven fabric, and FIG. 4B is a schematic plan view of a covered yarn according to another embodiment.

[FIG. 5] FIG. 5 is a schematic front view of a swimsuit using the stretch woven fabric.

[FIG. 6] FIG. 6 is a schematic back view of the swimsuit using the stretch woven fabric.

[FIG. 7] FIG. 7A is a schematic front view of a men's swimsuit using the stretch woven fabric, and FIG. 7B is a back view thereof.

[FIG. 8] FIG. 8 is a schematic explanatory view illustrating a method for measuring the buoyancy of a swimsuit using the stretch woven fabric.

Description of the Invention

[0008] To make fabrics such as swimwear fabrics water repellent, the present inventors have focused on elastic polyurethane yarns, which have not received much

CLAIMS

1. A swimsuit comprising an elastic polyurethane yarn,
wherein the elastic polyurethane yarn comprises:
0.5 to 10% by mass of a cationic high-molecular-weight compound A having a number-average molecular weight of 2000 ~~or more~~ to 10000; and
an inorganic chlorine deterioration inhibitor B,
a mass ratio of the cationic high-molecular-weight compound A to the inorganic chlorine deterioration inhibitor B ranges from 0.3 to 3,
a silicone oil is applied to the elastic polyurethane yarn, ~~and~~
a fabric for the swimsuit is treated with water repellent finishing, and
a ratio of fluorine (F) to carbon (C) on the elastic polyurethane yarn is 0.030 or more and 0.073 or less in an elemental mass concentration according to scanning electron microscope - energy dispersive X-ray spectroscopy (SEM-EDX), where the elemental mass concentration is measured by SEM-EDX using an elastic polyurethane yarn that is exposed on a surface of a dismantled fiber structure or an elastic polyurethane fiber that is taken out from an unraveled yarn, and the F/C ratio is calculated from the obtained elemental mass concentration.

2. The swimsuit according to claim 1, wherein ~~the swimsuit comprises an elastic polyurethane yarn whose ratio of fluorine (F) to carbon (C) on the elastic polyurethane yarn is 0.030 or more in an elemental mass concentration according to scanning electron microscope - energy dispersive X-ray spectroscopy (SEM-EDX)~~ a content of silicone in the silicone oil is 0.5 to 10% by mass in dry mass.

3. The swimsuit according to claim 1 or 2, wherein the swimsuit comprises 5 to 70% by mass of the elastic polyurethane yarn.

4. The swimsuit according to any of claims 1 to 3, wherein the fabric for the swimsuit has a water repellency of grade 4 or higher in the spray test according to JIS L 1092.

5. The swimsuit according to any of claims 1 to 4, wherein the fabric for the swimsuit has a water retention rate after 60 minutes of 5.8% by mass or more and 50% by mass or less of the mass of the swimsuit,
the water retention rate is determined by
Water retention rate (%) = ((Weight after treatment – Weight before treatment) / Weight before treatment) × 100,
where the weight before treatment is measured in the following manner: a circle of diameter 11.2 cm is drawn in a middle of each fiber structure that is

cut in 20 cm long and 20 cm wide, and the fiber structure is stretched to extend the circled area by 80%, to which a specimen holding frame for a water repellency test (JIS L 1092) is attached; after a spray test (JIS L 1092), the fiber structure is removed from the holding frame and air-dried in an environment of 20°C × 53% RH; ten pieces of the same fiber structure are prepared, and each is weighed as a weight before treatment, and

the weight after treatment is measured in the following manner: 30 L of water (water temperature: 25 to 29°C) is filled in a washing machine (JIS C 9606); the ten pieces of the fiber structure are immersed in the water, rotated for a predetermined period of time (10 minutes, 60 minutes, 120 minutes) under "strong conditions," and then taken out from the water one by one; the ten pieces of the fiber structure are inclined about 15 degrees in a spread state for 10 seconds to remove water droplets from the fiber structure, and each is weighed as a weight after treatment.

6. The swimsuit according to any of claims 1 to 5, wherein the elastic polyurethane yarn is covered with another synthetic fiber yarn.

7. The swimsuit according to any of claims 1 to 6, wherein the fabric for the swimsuit comprises a polyamide fiber yarn or a polyester fiber yarn.

8. The swimsuit according to any of claims 1 to 7, wherein the fabric for the swimsuit has a tearing strength of 8 N or more and 19 N or less according to JIS L 1096.

9. The swimsuit according to any of claims ~~1 to 8~~ 1 to 7, wherein the fabric for the swimsuit has a bursting strength of 200 kPa or more and 490 kPa or less according to JIS L 1096.

10. The swimsuit according to any of claims 1 to 9, wherein the fabric for the swimsuit is at least one of a woven fabric or a knitted fabric.

11. The swimsuit according to any of claims 1 to 10, wherein the fabric for the swimsuit has a buoyancy of 1.70 g or more and 2.19 g or less per 1 g of the fabric.

12. The swimsuit according to any of claims 1 to 11, wherein the swimsuit has a buoyancy of 1.45 g or more and 1.53 g or less per 1 g of the swimsuit.

13. The swimsuit according to claim 10, wherein the swimsuit is made from a stretch woven fabric in which a plain weave part and a weft double weave part are repeated alternately or a stretch woven fabric in which a plain weave part and a warp double weave part are repeated alternately.

the plain weave part is a depression and the weft double weave part or the warp double weave part is a projection, constituting a stripe pattern as a whole, and

the stripe pattern is arranged along a stature direction of the swimsuit.