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(54) **Fabric for screen including dope dyed fiber**

(57) Screen fabrics are provided. In an embodiment, the screen fabric includes a regular fiber and a dope dyed fiber. The dope dyed fiber is directly included in either warps or wefts or both. Alternatively, a blended or plied fiber of the regular fiber and the dope dyed fiber is includ-

ed in either warps or wefts or both. Differences in the lightness, chroma and hue of the screen fabric before and after post-processing are ± 2 or less, ± 2 or less and ± 0.1 or less, respectively.

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Description

[Technical Field]

5 **[0001]** The present invention relates to screen fabrics including a dope dyed fiber, and more particularly to fabrics that use a dope dyed fiber to eliminate the need for dyeing, which shortens the production process, and whose discoloration due to post-processing is minimized.

[Background Art]

10 **[0002]** In general, screens are installed in houses, hotels, restaurants and other buildings to protect people's private lives and block sunlight. Typical screens are produced by interconnecting a series of metal strips, wood strips or plastic strips at regular intervals and hanging the interconnected strips down. In recent years, many types of screen products have emerged in the market. Of these, a representative screen includes a synthetic resin fabric and a roll. The synthetic
15 resin fabric has a predetermined width and the roll is fixed to a window. The screen is designed in such a way that the fabric rolls down to cover the window or rolls up to secure a field of view when a user rotates the roll. Such screens may be called by different names, such as roll screens, panel screens or vertical blinds, according to the shape (e.g., roll or panel) of fabrics employed.

20 **[0003]** Conventional screen fabrics are usually made of polyvinyl chloride (PVC). Since PVC is decomposed by fire to give off chlorine (Cl) gas that is very harmful to humans, the use of PVC as a screen fabric material is prohibited in most countries, including the United States, Japan and European countries. Under such circumstances, polyethylene terephthalate (PET) is rapidly replacing PVC as a material for screen fabrics due to its excellent characteristics in heat resistance, stiffness, electrical properties and oil resistance. PET is also not susceptible to temperature and humidity variations.

25 **[0004]** PET fabrics are dyed after weaving to impart desired colors to final screen products.

[0005] The dyed screen fabrics undergo several post-processing steps, such as cleaning, antifouling, antistatic, coating, stiffening and heat treatment finishes. These post-processing steps severely discolor the screen fabrics, and as a result, cause many problems, such as increased defects and high production costs.

30 **[0006]** In attempts to solve the problems associated with the discoloration of screen fabrics, many dyeing methods have been developed. For example, a method is proposed for weaving yarn-dyed yarns to produce a dyed fabric. However, this method fails to effectively protect the fabric from discoloration due to post-processing.

[Disclosure]

35 [Technical Problem]

[0007] The present invention has been made in an effort to solve the problems of the prior art, and it is an object of the present invention to provide a screen fabric that is produced by weaving a dope dyed fiber spun from a mixture of a dye and polymer chips in a spinning machine to minimize discoloration due to post-processing while eliminating the
40 need for dyeing to impart a desired color, thereby reducing the number of defects and achieving high durability.

[Technical Solution]

45 **[0008]** According to an aspect of the present invention, there is provided a screen fabric for blocking light from a lighting system or sunlight, including a regular fiber and a dope dyed fiber wherein the dope dyed fiber is directly included in either warps or wefts or both, or a blended or plied fiber of the regular fiber and the dope dyed fiber is included in either warps or wefts or both, and wherein differences in the lightness, chroma and hue of the screen fabric before and after post-processing are ± 2 or less, ± 2 or less and ± 0.1 or less, respectively.

[0009] In an embodiment, the dope dyed fiber is a polyester fiber.

50 **[0010]** In an embodiment, either the regular fiber or the dope dyed fiber or both are blended or plied with a low-melting fiber in a weight ratio of 50:50 to 80:20.

[0011] In an embodiment, the weight ratio of the regular fiber to the dope dyed fiber is from 20:80 to 80:20.

55 **[0012]** According to another aspect of the present invention, there is provided a screen fabric for blocking light from a lighting system or sunlight, including a regular fiber and a flame retardant polyester dope dyed fiber wherein the dope dyed fiber is directly included in either warps or wefts or both, or a blended or plied fiber of the regular fiber and the flame retardant polyester dope dyed fiber is included in either warps or wefts or both, and wherein differences in the lightness, chroma and hue of the screen fabric before and after post-processing are ± 2 or less, ± 2 or less and ± 0.1 or less, respectively.

[0013] In an embodiment, either the regular fiber or the flame retardant polyester dope dyed fiber or both are blended or plied with a low-melting fiber in a weight ratio of 50:50 to 80:20.

[0014] In an embodiment, the weight ratio of the regular fiber to the flame retardant polyester dope dyed fiber is from 40:60 to 80:20.

5 **[0015]** In an embodiment, the regular fiber is a flame retardant fiber.

[Advantageous Effects]

10 **[0016]** The screen fabrics of the present invention show an insignificant degree of discoloration due to post-processing steps, such as washing, antifouling and heat treatment finishes, after weaving. Therefore, the number of defects in the screen fabrics is reduced, leading to high productivity and cost reduction.

[0017] In addition, screens using the screen fabrics of the present invention are not discolored even after long-term use.

[Best Mode]

15 **[0018]** Preferred embodiments of the present invention will now be described in detail. In describing the present invention, detailed descriptions of related known functions or configurations are omitted in order to avoid making the essential subject of the invention unclear.

20 **[0019]** The term "fabrics" is used herein to refer to all knitted fabrics, felt fabrics, plaited fabrics, non-woven fabrics, laminated fabrics, molded fabrics and webs.

[0020] In an embodiment, the present invention provides a screen fabric including a regular fiber and a dope dyed fiber in a mixed state.

[0021] Any filament fiber composed of a synthetic resin may be used without limitation as the regular fiber. A flame retardant filament fiber is preferably used to improve the flame retardancy of the fabric.

25 **[0022]** A filament fiber spun from a mixture of a dye and polymer chips in a spinning machine may be used without any limitation as the dope dyed fiber.

[0023] The dye is dispersed in the polymer chips before spinning into the dope dyed fiber. The dye is bonded within the fabric to ensure superior light and wash fastness of the fabric.

30 **[0024]** The screen fabric of the present invention may be produced by directly including the dope dyed fiber in either warps or wefts or both. Alternatively, the screen fabric of the present invention may be produced by blending or plying the regular fiber with the dope dyed fiber and including the blended or plied fiber in either warps or wefts or both.

[0025] Preferably, the dope dyed fiber is composed of a polyester synthetic resin that has excellent characteristics in terms of heat resistance, stiffness, electrical properties and oil resistance and is insusceptible to temperature and humidity variations.

35 **[0026]** Either the regular fiber or the dope dyed fiber or both may be blended or plied with a low-melting fiber. The use of the low-melting fiber eliminates the need for additional coating and imparts stiffness to the screen fabric, thus allowing the screen fabric to be suitable for use in a screen.

[0027] It is preferred to blend or ply the regular fiber and the dope dyed fiber with the low-melting fiber in a weight ratio of 50:50 to 80:20.

40 **[0028]** The screen fabric undergoes heat treatment to melt-bond the low-melting fiber to the regular fiber and the dope dyed fiber. This melt-bonding of the low-melting fiber between the regular fiber and the dope dyed fiber imparts stiffness and shape stability to the fabric.

45 **[0029]** As non-limiting examples of the low-melting fiber, there may be used sheath-core type and split type conjugate fibers. For example, the low-melting fiber may be a flame retardant polyester filament in which a low-melting polyester resin is included in the sheath and a flame retardant polyester resin is included in the core. The flame retardant polyester resin may be selected from the group consisting of polyethylene terephthalate, polybutylene terephthalate and a combination thereof. The low-melting polyester resin may contain isophthalic acid, terephthalic acid, ethylene glycol and diethylene glycol moieties.

50 **[0030]** The flame retardant polyester resin may have a melting point of 220 to 260°C. The low-melting polyester resin may have a melting point of 110 to 220°C. The polyester having a melting point lower than 110°C may be problematic in terms of shape stability. The polyester having a melting point higher than 220°C may adversely affect the resin of the core.

55 **[0031]** The content ratio of the regular fiber and the dope dyed fiber in the screen fabric may be varied depending on the materials of the regular fiber and the dope dyed fiber and the desired lightness, chroma and hue differences of the fabric. Most preferably, the weight ratio of the regular fiber to the dope dyed fiber is from 20:80 to 80:20.

[0032] In another embodiment, the present invention provides a screen fabric including a regular fiber and a flame retardant polyester dope dyed fiber. The use of the flame retardant polyester dope dyed fiber imparts flame retardancy to the screen fabric, thus eliminating the need for additional flameproof finish.

[0033] The regular fiber and the flame retardant polyester dope dyed fiber may be blended or plied with a low-melting fiber.

[0034] It is preferred to blend or ply the regular fiber and the flame retardant polyester dope dyed fiber with the low-melting fiber in a weight ratio of 50:50 to 80:20.

[0035] The content ratio of the regular fiber and the flame retardant polyester dope dyed fiber in the screen fabric may be varied depending on the materials of the regular fiber and the flame retardant polyester dope dyed fiber and the desired lightness, chroma and hue differences of the screen fabric. Most preferably, the weight ratio of the regular fiber to the flame retardant polyester dope dyed fiber is from 20:80 to 80:20.

[0036] Preferably, the flame retardant polyester dope dyed fiber is one that is copolymerized with a phosphorus flame retardant. The phosphorus flame retardant is preferably present in an amount such that the concentration of phosphorus (P) atoms in the polyester resin is from 5,000 to 10,000 ppm. If the content of the phosphorus (P) atoms is less than 5,000 ppm, sufficient flame retardancy is not exhibited. Meanwhile, if the content of the phosphorus (P) atoms exceeds 10,000 ppm, the melt viscosity of the polyester resin is low, resulting in poor workability and physical properties upon spinning.

[0037] The screen fabric may further include at least one additive selected from UV absorbers and processing aids. The UV absorbers serve to improve the light fastness of the screen fabric and may be benzotriazole or benzophenone compounds. Examples of processing aids suitable for use in the screen fabric include antistatic agents, water/oil repellants, antifouling agents, antibacterial agents, water absorbers and antislip agents, which are commonly used in the art. It is to be understood that the addition of such well-known processing aids is encompassed within the scope of the present invention without departing from the substantial spirit of the invention.

[Mode for Invention]

[0038] The following examples explain methods for producing screen fabrics according to the present invention and are in no way intended to limit the scope of the present invention.

EXAMPLES

Example 1

[0039] A regular polyester fiber as warp was woven with a polyester dope dyed fiber as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 2

[0040] A regular polyester fiber as warp was woven with a plied fiber of a polyester dope dyed fiber and a regular fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 3

[0041] A regular polyester fiber as warp was woven with a flame retardant polyester dope dyed fiber as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 4

[0042] A regular polyester fiber as warp was woven with a plied fiber of a flame retardant polyester dope dyed fiber and a regular fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 5

[0043] A flame retardant regular polyester fiber as warp was woven with a plied fiber of a polyester dope dyed fiber and a low-melting fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 6

[0044] A regular polyester fiber as warp was woven with a plied fiber of a polyester dope dyed fiber and a low-melting fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 7

[0045] A regular polyester fiber as warp was woven with a plied fiber of a flame retardant polyester dope dyed fiber and a low-melting fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch.

Example 8

[0046] A flame retardant regular polyester fiber as warp was woven with a plied fiber of a flame retardant polyester dope dyed fiber and a low-melting fiber (1:1 (w/w)) as weft by plain weaving to produce a screen fabric. The screen fabric had a warp density of 100 yarns/inch and a weft density of 100 yarns/inch. ✖ Test Methods

1. Discoloration experiments on the screen fabrics of Examples 1-5 after post-processing

[0047] After each of the screen fabrics produced in Examples 1-5 was subjected to washing and antifouling finishes, the degree of discoloration of the screen fabric before and after the post-processing steps was measured using a computer color match (C.C.M) system in terms of lightness, chroma and hue differences. Table 1 summarizes the degree of discoloration after the washing finish and Table 2 summarizes the degree of discoloration after the antifouling finish.

[0048] The washing and antifouling finishes were carried out by known methods.

TABLE 1

Properties	Lightness difference	Chroma difference	Hue difference
Example 1	-0.82	1.08	0.08
Example 2	-0.76	0.93	0.07
Example 3	-0.99	1.23	0.07
Example 4	-0.89	0.96	0.06
Example 5	-0.88	1.11	0.08

TABLE 2

Properties	Lightness difference	Chroma difference	Hue difference
Example 1	-1.42	1.49	0.09
Example 2	-1.34	1.28	0.08
Example 3	-1.78	1.54	0.08
Example 4	-1.44	1.49	0.08
Example 5	-1.32	1.67	0.09

2. Discoloration experiments on the screen fabrics of Examples 6-8 after post-processing

[0049] After each of the screen fabrics produced in Examples 6-8 was subjected to washing, antifouling and heat treatment finishes, the degree of discoloration of the screen fabric before and after the respective processing steps was measured in terms of lightness, chroma and hue differences. The heat treatment finish is a post-processing step to melt-bond the low-melting fiber to the regular fiber and the dope dyed fiber. Table 3 summarizes the degree of discoloration after the washing finish, Table 4 summarizes the degree of discoloration after the antifouling finish, and Table 5 summarizes the degree of discoloration after the heat treatment finish.

[0050] The washing and antifouling finishes were carried out by known methods, and the heat treatment finish for melt-bonding was carried out at 170°C.

TABLE 3

Properties	Lightness difference	Chroma difference	Hue difference
Example 6	-0.84	1.52	0.08
Example 7	-0.96	1.67	0.09
Example 8	-0.92	1.55	0.09

TABLE 4

Properties	Lightness difference	Chroma difference	Hue difference
Example 6	-1.39	1.71	0.08
Example 7	-1.53	1.81	0.08
Example 8	-1.47	1.70	0.09

TABLE 5

Properties	Lightness difference	Chroma difference	Hue difference
Example 6	-1.92	1.87	0.08
Example 7	-1.97	1.69	0.09
Example 8	-1.90	1.67	0.09

[0051] As can be seen from the experimental results in Tables 1-5 showing the discoloration differences of the screen fabrics of Examples 1-8, the lightness, chroma and hue differences of each of the screen fabrics before and after the post-processing steps were ± 2 or less, ± 2 or less and ± 0.1 or less, respectively, indicating that little discoloration of the screen fabrics was caused by the post-processing steps.

[0052] Although the present invention has been described herein with reference to the foregoing embodiments, the scope of the present invention is not limited to the embodiments. Therefore, it will be evident to those skilled in the art that various substitutions, modifications and changes are possible, without departing from the spirit of the invention as disclosed in the accompanying claims.

Claims

1. A screen fabric including a regular fiber and a dope dyed fiber wherein the dope dyed fiber is directly included in either warps or wefts or both, or a blended or plied fiber of the regular fiber and the dope dyed fiber is included in either warps or wefts or both, and wherein differences in the lightness, chroma and hue of the screen fabric before and after post-processing are ± 2 or less, ± 2 or less and ± 0.1 or less, respectively.
2. The screen fabric of claim 1, wherein the dope dyed fiber is a polyester fiber.
3. The screen fabric of claim 1 or 2, wherein either the regular fiber or the dope dyed fiber or both are blended or plied with a low-melting fiber in a weight ratio of 50:50 to 80:20.
4. The screen fabric of claim 1 or 2, wherein the weight ratio of the regular fiber to the dope dyed fiber is from 20:80 to 80:20.
5. A screen fabric for blocking light from a lighting system or sunlight, including a regular fiber and a flame retardant polyester dope dyed fiber wherein the dope dyed fiber is directly included in either warps or wefts or both, or a blended or plied fiber of the regular fiber and the flame retardant polyester dope dyed fiber is included in either warps or wefts or both, and wherein differences in the lightness, chroma and hue of the screen fabric before and after post-processing are ± 2 or less, ± 2 or less and ± 0.1 or less, respectively.
6. The screen fabric of claim 5, wherein either the regular fiber or the flame retardant polyester dope dyed fiber or both

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are blended or plied with a low-melting fiber in a weight ratio of 50:50 to 80:20.

7. The screen fabric of claim 5, wherein the weight ratio of the regular fiber to the flame retardant polyester dope dyed fiber is from 40:60 to 80:20.

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8. The screen fabric of claim 1 or 5, wherein the regular fiber is a flame retardant fiber.

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