(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 039 830 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.03.2009 Bulletin 2009/13

(51) Int Cl.:
E01C 13/08 *(2006.01)*

(21) Application number: **07018670.5**

(22) Date of filing: **22.09.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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(54) **Cool artifical turf**

(57) An artificial turf surface comprising fibrous materials, such as fibers, filaments and/or tapes, and if applicable infill materials, wherein the artificial turf surface additionally comprises one or more additive(s) rendering an increased light reflectance to the artificial turf surface.

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Description

[0001] The present invention pertains to artificial turfs, in particular to artificial turf surfaces.

[0002] Artificial turfs or synthetic turfs are known as grass-like man-made surfaces manufactured from synthetic materials. They are most often used in arenas for sports that were originally or are normally played on grass; however, it is now being used on residential lawns and commercial applications, as well.

[0003] The first artificial turfs developed and installed already in the early 60ies were a far harder surface than grass, and soon became known as an unforgiving playing surface, which was prone to cause more injuries.

[0004] In the early 21st century, new artificial playing surfaces using sand and/or rubber infill were developed. These "next generation", of artificial grass surfaces are often virtually indistinguishable from grass when viewed from any distance, and are generally regarded as being about as safe to play on as a typical grass surface - perhaps even safer in cold conditions.

[0005] Many clubs have installed the new synthetic turf surfaces (most commonly as part of an all-weather training capability), while some clubs which have maintained grass surfaces are now re-considering artificial turf. With football clubs in Europe looking to reduce both maintenance costs and the number of winter matches that are cancelled due to frozen pitches, the issue has also been re-visited by that sport's governing bodies.

[0006] The most common type uses polyethylene "grass" about 5 centimeters long, which is lubricated and tufted into a woven backing fabric the rear of which is coated with a polyurethane or latex backing medium to lock the tufts in to place. The whole thing is then infilled to the client's specification with sand and rubber granules, which keeps the fibers upright and provides the right level of shock absorbency and deformability. The majority of the 15 or so turf manufacturers approved by FIFA use this technology. The other sort has a base of expanded polypropylene, a foamy material originally developed as a shock absorber for the car industry. The grass is also made of lubricated polyethylene fibers, but they are shorter and more densely packed than on an infilled pitch, and are also interspersed with short, curly, spring-like fibers that keep the blades upright. The finishing touch is an 8-millimeter filling of rubber granules.

[0007] Although artificial turfs are mostly applied in sport arenas, in the context of this invention the meaning of "artificial turf" is used in a broader sense, encompassing any applications and modification that comprise synthetic grass, i.e. grass that is made of a synthetic material, usually a polymer such as polyethylene, polypropylene and the like. Such additional applications comprise but are not limited to landscape applications and to green roofs on buildings.

[0008] The components used for artificial turf surfaces comprise - as mentioned above - fibers, filaments and tapes, and if applicable infill materials.

[0009] Whilst already having advantages over natural grass surfaces in cold areas or in the wintertime, the overall comfort of artificial turfs in hotter climates or seasons is still subject to improvement.

[0010] It is thus an objective of the invention to provide an artificial turf that offers comfort and safety both under hot and cold conditions.

[0011] This objective is being achieved by an artificial turf surface that comprises fibrous materials, such as fibers, filaments and/or tapes, and if applicable infill materials, wherein the artificial turf surface additionally comprises one or more additive(s) and/or pigment(s) rendering an increased light reflectance to the artificial turf surface.

[0012] The light reflectance obtained by the addition of the additives and/or pigments is at least 10 % higher compared to artificial turf surfaces without these additives and/or pigments.

[0013] The terms additives and pigments are being used likewise in the description of the invention.

[0014] For this invention the term "light" is used in its physical meaning and encompasses a wavelength range from about 380 nm to about 1 mm, i.e. the spectrum of both the visible light (from about 380 nm to about 780 nm) and the infrared light (from about 700 nm to about 1 mm). Particularly preferred is the reflectance of the infrared (IR) light, the so-called infrared light or heat radiation. Even more preferred are additives and/or pigments with an increased reflectance in the wavelength range from about 700 nm to about 3000 nm, the so-called near infrared (NIR) range.

[0015] Thus, it is preferred to select the additives and/or pigments in such a way that the reflectance is increased in the electromagnetic wavelength range of the near infrared light.

[0016] Preferably, the light reflectance is at least as high as that of a natural grass turf surface, preferably 10 %, even more preferred 20 %, higher than that of a natural grass turf surface.

[0017] The additives or pigments thus have the property to reflect heat generated by sunlight and other light or heat sources in at least the same order of magnitude as Chlorophyll - the green pigment in natural turf does - whilst pigments currently used in artificial turf have a higher IR absorption.

[0018] Preferably, the additive(s) or pigment(s) is or are incorporated in the fibrous material, even more preferably it is or are located at or near the surface of the fibrous material.

[0019] Any pigment that is capable to reflect infra red light can be used as additive. It is, however, preferred to apply as additives those pigments that are selected from a group containing metal oxides, mixed metal oxides, cobalt compounds and chromium compounds.

[0020] It is preferred that the fibrous material is made of a polymer, even more preferred if the polymer is selected

from a group containing polyethylene, polypropylene, plastomer blends, nylon and copolymers and/or blends thereof.

[0021] The pigments are added in an amount that ranges from about 0.5% to about 4% wt.-% in relation to the polymer.

[0022] Artificial turfs having a surface according to the invention exhibit a considerably reduced surface temperature. A temperature decrease by 15 °C can easily be achieved.

[0023] This invention is especially an advantage for sport fields and landscape applications to increase the player's and users comfort and safety aspects.

[0024] Another important claim for this invention is energy savings. Where artificial turf is used as a kind of insulation material to prevent - heat build up - of that what has been covered by it. For example green roofs on buildings etc. to reduce energy cost for climate control systems.

[0025] As a consequence this invention pertains also to the use of the artificial turf surface for sport fields and landscape applications and to the use of the artificial turf as heat insulation in green roofs on buildings.

[0026] The invention is further elucidated by the following non-limiting example(s).

[0027] Hemispherical spectral reflectance measurements were performed in accordance with ASTM Standard Test Method E903 (1996). The measurements were performed with a Perkin-Elmer Lambda 950 Spectrophotometer utilizing an integrating sphere (Fig A1.3 of E903 [1996]). Total reflectance measurements were obtained in the solar spectrum from 2500 nm to 300 nm at an incident angle of 8°. The measurements employ a detector-baffled, wall-mounted-integrating sphere that precludes the necessity of employing a reference standard except to define the instrument's 100% line. The measurements are properly denoted as being 'hemispherical spectral reflectance'.

[0028] Total solar ρ reflectance was obtained by integrating the spectral data against Air Mass 1.5 (ASTM G159-98) direct solar spectrum utilizing 105 weighted ordinates.

[0029] The NIR region from 724nm to 2494nm was obtained by integrating the spectral data against Air Mass 1.5 (ASTM G159-98) direct solar spectrum utilizing 66 weighted ordinates.

[0030] The measured artificial grass specimens were cut from larger specimens that were used for a temperature study.

[0031] With all test methods, there typically is a level of uncertainty for the test data due to the acceptable operating tolerances of the instrumentation and variation caused by the test method. The estimated tolerances are expected to be less than plus or minus 2% for most materials tested to ASTM E903.

Table

Specimen Code	% Solar Reflectance	% NIR Reflectance
Live Grass	33.7	52.8
25/23 - 888 Tex Olive Green	16.2	24.0
25/24 - 888 Tex Sports Green	16.8	25.1
52/53 - 888 Tex Sports Green	22.6	38.7
52/54 - 888 Tex Olive Green	33.9	55.0

[0032] It can be seen from the above table that with the entire specimen the NIR reflectance is increased compared to the reflectance of the live grass. In case of 52/54-88 Text Olive Grass also the solar reflectance is at least on the same level as live grass and thus improved compared to natural grass without the additives and/or pigments according to the invention.

Claims

1. An artificial turf surface comprising fibrous materials, such as fibers, filaments and/or tapes, and if applicable infill materials, wherein the artificial turf surface additionally comprises one or more additive(s) rendering an increased light reflectance to the artificial turf surface.

2. The artificial turf surface of claim 1, wherein the light is the infrared (IR) light in a wavelength range from about 700 nm to about 1 mm.

3. The artificial turf according to any of the preceding claims, wherein the additive(s) is or are incorporated in the fibrous material, preferably located at the surface of the fibrous material.

4. The artificial turf surface according to any of the preceding claims, wherein the additives are pigments selected from

a group containing metal oxides, mixed metal oxides, cobalt compounds and chromium compounds.

5. The artificial turf surface according to any of the preceding claims, wherein the fibrous material is selected from a group containing polyethylene, polypropylene, plastomer blends, nylon, and copolymers and blends thereof.

6. Use of the artificial turf surface according to any of the preceding claims for sport fields and landscape applications.

7. Use of the artificial turf surface according to any of the preceding claims as heat insulation in green roofs on buildings.

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EUROPEAN SEARCH REPORT

Application Number
EP 07 01 8670

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 2004/214000 A1 (HUFF CARL L [US] ET AL) 28 October 2004 (2004-10-28) * paragraphs [0010], [0041] * -----	1,2,4,6	
X	US 5 958 527 A (PREVOST JEAN [CA]) 28 September 1999 (1999-09-28) * column 6, lines 37-48 * -----	1,2,6	
X	US 2003/056432 A1 (PREVOST JEAN [CA]) 27 March 2003 (2003-03-27) * paragraph [0043] * -----	1,2,6	
X	NL 1 029 940 C1 (HIGHLANDS GRASS [NL]) 15 March 2007 (2007-03-15) * page 2, lines 22-28; figure 1 * -----	7	

TECHNICAL FIELDS SEARCHED (IPC)

E01C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 January 2008	Gallego, Adoración

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 01 8670

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82