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(54) **A material for packaging of foodstuff, and a package for foodstuff**

(57) The invention relates to a material (2) suitable for packaging foodstuff, the material comprising base paper (4) coated on at least one side with a coating (3). The coating comprises one or more platy coating pigments, and binder comprising carboxymethyl cellulose (CMC), and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%. The total dry

weight of said platy coating pigment and said binder(s) contains 20 to 60 wt% of said binder(s), more preferably between 25 and 55 said binder(s), and the total dry weight of said platy coating pigment and the binder(s) constitutes at least 70 wt% of said coating (3). Furthermore, the invention relates to a food package (1) comprising said material (2).

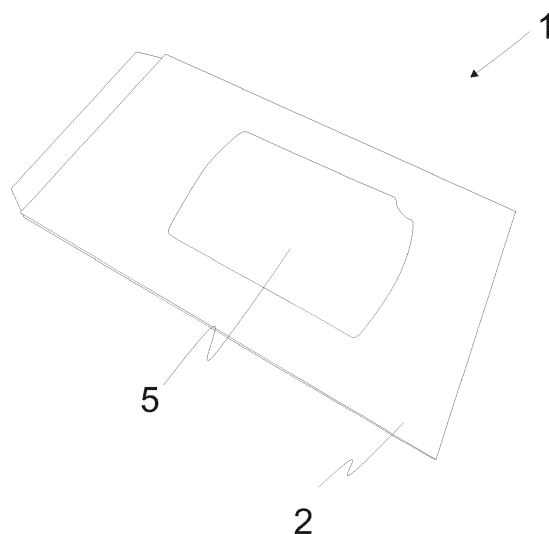


Fig.2

Description

Field of the invention

[0001] The invention relates to a material for packaging of foodstuff. Further, the invention relates to a package for foodstuff.

Background of the invention

[0002] In industry, a large variety of packaging materials are manufactured for packaging foodstuffs. For example, bread is typically packaged in either a package made of a material coated with plastic, a plastic package, or a paper package.

[0003] Plastic or a packaging material coated with plastic is normally used when the aim is to keep the foodstuff, such as fresh bread, saleable for several days. A material coated with plastic typically prevents the surface of for example said fresh bread from drying, but at the same time it causes softening of the surface of the product.

[0004] Paper material, in turn, is typically used when the aim is to keep the surface of the foodstuff, such as fresh bread to be packed, crispy. Thus, said fresh bread typically has to be sold on the packaging day, because otherwise the surface of said bread dries too much and the crust becomes too thick.

[0005] Consequently, there is still a need for better packaging materials in the industry.

Brief summary of the invention

[0006] It is an aim of this invention to present a material which is particularly well suited for the packaging of foodstuffs. Further, it is an aim of this invention to present a food package comprising said material. The material for packaging food, and/or the food package according to the invention may keep, for example, the crust of fresh bread more crispy compared with a plastic package of prior art or a package coated with plastic. Nevertheless, the product packed in the material according to the invention may remain saleable longer than, for example, when a paper bag of prior art is used as the packaging material.

[0007] To achieve the aim of the invention, the material for packaging foodstuff according to the invention is primarily characterized in what will be presented in the appended claim 1. The food package according to the invention is primarily characterized in what will be presented in the appended claim 16.

[0008] Advantageously, the material suitable for packaging foodstuff comprises a base paper coated on at least one side with a coating comprising

- one or more platy coating pigments, and
- binder comprising carboxymethyl cellulose (CMC), and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%.

[0009] Advantageously, the total dry weight of said platy coating pigment and said binder(s) contains 20 to 60 wt% of said binder(s), more preferably between 25 and 55 said binders, and the total dry weight of said platy coating pigment and the binder(s) constitutes at least 70 wt% of said coating.

[0010] Advantageously, the coating comprises 1 to 5 coating layers, more preferably 1 to 4 coating layers. Advantageously, one binder comprises between 50 and 100 wt% of binders used in one coating layer.

[0011] In an advantageous embodiment, starch having amylopectin content between 70 and 100 wt% comprises at least 50 wt% of binders in at least one of the coating layers.

[0012] In an advantageous embodiment, carboxymethyl cellulose comprises at least 50 wt% of binders of at least one of the coating layers.

[0013] In an advantageous embodiment, the platy coating pigment comprises at least 50 wt% of kaolin.

[0014] In an advantageous embodiment, the coating comprises at least 2 coating layers, from which at least one comprises nanofibrillar cellulose as the binder. Preferably nanofibrillar cellulose comprises at least 50 wt% of binders of at least one of the coating layers.

[0015] Advantageously, the content of the coating, in dry weight, is 1 to 17 g per m², more preferably between 3 and 14 g per m².

[0016] Advantageously, the content of the coating in one coating layer, in dry weight, is 1 to 12 g per m², more preferably between 2 and 8 g per m².

[0017] In an advantageous example, the water vapour transmission rate of the material at an air humidity of 50% and a temperature of 23°C is 80 to 400 g per m² per day, more preferably 120 to 280 g per m² per day.

[0018] In another advantageous example, the water vapour transmission rate of the material at an air humidity of 50% and a temperature of 23°C is 2 to 20 g per m² per day, more preferably 3 to 12 g per m² per day.

[0019] Advantageously, food package comprises paper, wherein at least 50% consists of material in which base paper has been coated on at least one side with a coating, the coating comprising

- one or more platy coating pigments, and
- binder comprising carboxymethyl cellulose (CMC), and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%, and
- the total dry weight of said platy coating pigment and said binder(s) contains 20 to 60 wt% of said binder(s), and
- the total dry weight of said platy coating pigment and said binder(s) constitutes at least 70 wt% of said coating.

[0020] In an example, the material according to the invention is intended for the packaging of bakery products, such as hamburgers or pastries. In an advantageous ex-

ample, the material according to the invention for packaging foodstuffs is intended for the packaging of fresh bread. In a third example, the material for packaging foodstuff according to the invention is intended for the packaging of dry products, such as dried bread and/or crispbread.

[0021] The material and the food package according to the invention have several advantages. The material according to the invention can be manufactured in such a way that appropriate water permeability, water vapour permeability as well as air permeability are achieved. This has not been possible with packaging materials of prior art.

[0022] The material according to the invention for packaging foodstuffs, as well as the food package according to the invention can be manufactured in an environmentally friendly way so that the material and/or food package can be, for example, recycled and/or composted and/or burnt after usage. The product is very suitable for use with foodstuffs, and it may enable the product to be packaged to maintain the desired properties longer, for example the maintenance of the crust of fresh bread crispy for a longer time so that the bread is still saleable.

Description of the drawings

[0023] In the following, the invention will be described in more detail with reference to the appended drawings, in which:

- Figs 1a to 1b shows a material according to an embodiment of the invention for packaging foodstuffs, in a cross-sectional view,
- Fig. 1c shows an example of a coating in a cross-sectional view, and
- Fig. 2 shows a food package according to an embodiment.

Detailed description of the invention

[0024] In the following disclosure, all percentages and grammages are by dry weight, if not indicated otherwise.

[0025] In this application, reference will be made to Figs. 1 to 2, in which the following reference numerals are used:

- 1 food package,
- 2 material for packaging foodstuffs, packaging material,
- 3 coating,
- 3a first coating layer,
- 3b second coating layer,
- 3c third coating layer,
- 3d fourth coating layer,
- 4 base paper, and
- 5 location in the food package where no material 2

has been used.

[0026] In this application, the term gsm refers to grams per square meter (g/m²).

[0027] The term "RH" relates to relative humidity of the air.

[0028] The term "platy coating pigment" refers to coating pigments present in a platy form. The term "platy" refers to a structure in which one dimension is substantially smaller than the two other dimensions of the structure. Preferably, one dimension is at least 2 or at least 3 times, more preferably at least 5 times or at least 10 times, and most preferably at least 20 times smaller than the two other dimensions of the structure.

[0029] The term "base paper" 4 refers to paper of prior art comprising natural fibres as its main raw material. Further, the base paper may comprise, for example, one or more fillers and/or additives. The base paper is preferably uncoated paper.

[0030] The term "natural fibre" refers to any plant material that contains cellulose. The natural fibre may be wood-based. The wood may be softwood, such as spruce, pine, silver fir, larch, Douglas fir, or Canadian hemlock; or hardwood, such as birch, aspen, poplar, alder, eucalyptus, or acacia; or a mixture of softwood and hardwood. Other than wood-based raw materials may include agricultural waste, grasses or other plant materials, such as straw, leaves, bark, seeds, legumes, flowers, tops, or fruit, which have been obtained from cotton, corn, wheat, oat, rye, barley, rice, flax, hemp, Manila hemp, sisal hemp, jute, ramee, kenaf hemp, bagasse, bamboo, or reed. Preferably, the natural fibre comprises chemically pulped natural fibre, that is, pulp made in a chemical pulping process. In an advantageous example, the content of chemically pulped natural fibres in all the natural fibres used in the base paper product is thus at least 70 wt%, at least 80 wt% or at least 90 wt%, advantageously at least 95 wt% or 98 wt%. Preferably, all the natural fibres used in the base paper are chemically pulped natural fibres. The diameter of the natural fibres is normally 15 to 25 μm and the length more than 500 μm , but the present invention is not intended to be limited to these parameters.

[0031] The term "WVTR" refers to water vapour transmission rate, *i.e.* water vapour barrier at conditions of RH 50%, temperature 23°C.

[0032] The term "KIT" refers to a determining method according to the Tappi standard (Tappi T559 cm02) for paper and paperboard with oil and grease resistance. The term "Cobb" refers to the so-called Cobb value measured according to the standard ISO 535:1991. "Air permeability" is measured according to the standard ISO 5636-5:2003. "Water vapour permeability" is measured according to the standard ISO 2528:1995.

[0033] The term "Cobb" refers to Cobb-value that is measured according to ISO 535:1991 (valid in 2011).

[0034] The term "nanofibrillar cellulose" refers to a collection of isolated cellulose microfibrils or microfibril bun-

dles derived from cellulose raw material. There are several widely used synonyms for nanofibrillar cellulose. For example: nanofibrillated cellulose (NFC), nanocellulose, microfibrillar cellulose, cellulose nanofiber, nano-scale fibrillated cellulose, microfibrillated cellulose (MFC), or cellulose microfibrils. Nanofibrillar cellulose described in this application is not the same material as the so called cellulose whiskers, which are also known as: cellulose nanowhiskers, cellulose nanocrystals, cellulose nanorods, rod-like cellulose microcrystals or cellulose nanowires. In some cases, similar terminology is used for both materials, for example by Kuthcarlapati et al. (Metals Materials and Processes 20(3):307-314, 2008) where the studied material was called "cellulose nanofiber" although they clearly referred to cellulose nanowhiskers. Typically these materials do not have amorphous segments along the fibrillar structure as fibril cellulose, which leads to more rigid structure. Cellulose whiskers are also shorter than fibril cellulose.

[0035] The nanofibrillar cellulose is prepared normally from cellulose raw material of plant origin. The raw material can be based on any plant material that contains cellulose. The raw material can also be derived from certain bacterial fermentation processes. Plant material may be wood. Wood can be from softwood tree such as spruce, pine, fir, larch, douglas-fir or hemlock, or from hardwood tree such as birch, aspen, poplar, alder, eucalyptus or acacia, or from a mixture of softwoods and hardwoods. Non-wood material can be from agricultural residues, grasses or other plant substances such as straw, leaves, bark, seeds, hulls, flowers, vegetables or fruits from cotton, corn, wheat, oat, rye, barley, rice, flax, hemp, manila hemp, sisal hemp, jute, ramie, kenaf, bagasse, bamboo or reed. The cellulose raw material could be also derived from cellulose-producing micro-organisms. The micro-organisms can be of the genus *Acetobacter*, *Agrobacterium*, *Rhizobium*, *Pseudomonas* or *Alcaligenes*, preferably of the genus *Acetobacter* and more preferably of the species *Acetobacter xylinum* or *Acetobacter pasteurianus*.

[0036] Microfibrils of the nanofibrillar cellulose have typically high aspect ratio: the length might exceed one micrometer while the number-average diameter is typically below 200 nm. The diameter of microfibril bundles can also be larger but generally less than 1 μm . The smallest microfibrils are similar to so called elementary fibrils, which are typically 2-12 nm in diameter. The dimensions of the fibrils or fibril bundles are dependent on raw material and disintegration method. The nanofibrillar cellulose may also contain some hemicelluloses; the amount is dependent on the plant source. Mechanical disintegration of nanofibrillar cellulose from cellulose raw material, cellulose pulp, or refined pulp is carried out with suitable equipment such as a refiner, grinder, homogenizer, colloidizer, friction grinder, ultrasound sonicator, fluidizer such as microfluidizer, macrofluidizer or fluidizer-type homogenizer.

[0037] The nanofibrillar cellulose is preferably made of

plant material. One alternative is to obtain the fibrils from non-parenchymal plant material where the fibrils are obtained from secondary cell walls. One abundant source of cellulose fibrils is wood fibres. The nanofibrillar cellulose is manufactured by homogenizing wood-derived fibrous raw material, which may be chemical pulp. The disintegration in some of the above-mentioned equipments produces fibrils which have the diameter of only some nanometers, which is 50 nm at the most and gives a dispersion of fibrils in water. The fibrils can be reduced to size where the diameter of most of the fibrils is in the range of only 2-20 nm only. The fibrils originating in secondary cell walls are essentially crystalline with degree of crystallinity of at least 55 %.

[0038] The surface of original, chemically unmodified cellulose in the fibrous starting material can be charged ionically in a chemical pretreatment before the mechanical disruptive treatment. In this way the internal bonds in the cellulose between the microfibrils is weakened, and it is thus possible to enhance the separation of fibrils. Some methods for charging the cellulose can be given as example. Oxidation pretreatment of cellulose before the mechanical disruptive treatment is a promising method for surface modification of native cellulose, by which carboxylate and aldehyde functional groups can be introduced into solid native cellulose under aqueous and mild conditions. When native cellulose is used, the oxidation occurs at the surface of the microfibrils, which become negatively (anionically) charged and subsequently results in repulsion of the microfibrils, thus easing fibrillation. Cellulose obtained through N-oxyl mediated catalytic oxidation (e.g. through 2,2,6,6-tetramethyl-1-piperidine N-oxide, known by abbreviation "TEMPO") or carboxymethylated cellulose are examples of anionically charged nanofibrillar cellulose where the anionic charge is due to a dissociated carboxylic acid moiety. Cellulose derivative where the cellulose contains quaternary ammonium groups is an example of cationically charged nanofibrillar cellulose.

[0039] The material 2 according to the invention for packaging of foodstuffs comprises base paper 4 coated on one side or both sides. Preferably, the base paper 4 is coated on one side only.

[0040] Preferably the coating 3 comprises one, two, three, four or five coating layers. If the coating 3 comprises more than one coating layer on one side of the base paper, the coating layers are preferably one on another as shown in Figures 1 b and 1 c. The first coating layer 3a is preferably on the base paper 4.

[0041] The coating 3 comprises platy coating pigment(s) and binder(s) comprising or consisting of carboxymethyl cellulose (CMC) and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%.

[0042] Advantageously, amylopectin content of said starch is between 80 and 100 wt%, or between 85 and 100 wt%, more preferably between 90 and 100 wt%, or between 95 and 100 wt%, and most preferably between

98 and 100 wt%, or between 99 and 100 wt%.

[0043] Advantageously, the platy coating pigment comprises talc, kaolin, and/or mica. According to an advantageous example, the content of kaolin in the platy coating pigments used in the coating 3 is 50 wt%, 60 wt%, 70 wt%, 80 wt%, 90 wt%, 95 wt%, or 100 wt%, including any ranges and partial ranges. Advantageously, properties of the kaolin are not chemically changed.

[0044] Advantageously, the platy coating pigment comprises talc, kaolin, and/or mica. According to an advantageous example, the content of kaolin in the platy coating pigments used in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d is 50 wt%, 60 wt%, 70 wt%, 80 wt%, 90 wt%, 95 wt%, or 100 wt%, including any ranges and partial ranges.

[0045] Advantageously, the platy pigments comprises between 50 and 100 wt%, more preferably at least 60 wt%, at least 70 wt%, or at least 80 wt%, and most preferably at least 90 wt%, or at least 95 wt% of the all coating pigments used in the coating.

[0046] Advantageously, the platy pigments comprises between 50 and 100 wt%, more preferably at least 60 wt%, at least 70 wt%, or at least 80 wt%, and most preferably at least 90 wt%, or at least 95 wt% of the all coating pigments used in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d.

[0047] Advantageously one binder comprises at least 50 wt%, or at least 60 wt%, more preferably at least 70 wt.% or at least 80 wt% and most preferably at least 90 wt% of all binders in one coating layer, i.e. in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d. However, the different coating layers may comprise different binder(s).

[0048] Advantageously, at least one of the coating layers comprises

- carboxymethyl cellulose (CMC), starch having amylopectin content between 70 and 100 wt%, or nanofibrillar cellulose, and
- platy coating pigment, preferably kaolin.

[0049] Preferably, the first coating layer 3a comprises

- carboxymethyl cellulose (CMC), starch having amylopectin content between 70 and 100 wt%, or nanofibrillar cellulose, and
- platy coating pigment, preferably kaolin.

[0050] If the coating comprises or consists of two coating layers, the second coating layer 3b preferably comprises

- carboxymethyl cellulose (CMC), starch having amylopectin content between 70 and 100 wt%, or nanofibrillar cellulose, and

- platy coating pigment, preferably kaolin.

[0051] If the coating comprises or consists of three coating layers, the third coating layer 3c preferably comprises

- carboxymethyl cellulose (CMC), starch having amylopectin content between 70 and 100 wt%, or nanofibrillar cellulose, and
- platy coating pigment, preferably kaolin.

[0052] If the coating comprises or consists of four coating layers, the fourth coating layer 3d preferably comprises

- carboxymethyl cellulose (CMC), starch having amylopectin content between 70 and 100 wt%, or nanofibrillar cellulose, and
- platy coating pigment, preferably kaolin.

[0053] In the case of nanofibrillar cellulose is used as a main binder in at least one coating layer, i.e. comprising more than 50 wt% of the binder(s) in said coating layer(s), the coating preferably comprises at least one additional coating layer having another main binder, i.e. comprising at least 50 wt% of the binder(s) in said another coating layer.

[0054] In an advantageous example, the coating comprises two coating layers, and the first coating layer comprises starch having amylopectin content between 70 and 100 wt%, and kaolin.

[0055] Advantageously, the total dry content of the coating in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d is between 1 and 12 gsm, or between 1.5 and 8 gsm, more preferably between 2 and 6 gsm, or between 3 and 5 gsm.

[0056] The total dry content of the coating 3 according to the invention is preferably 1 to 17 gsm, or 3 to 16 gsm, more preferably 5 to 15 gsm, or 7 to 14 gsm, and most preferably 8 to 13 gsm, or 9 to 12 gsm, irrespective of whether the base paper is coated on one side or both sides.

[0057] In an advantageous example, the grammage of the base paper 4 is between 35 and 90 gsm, or between 40 and 80 gsm, or between 45 and 75 gsm.

[0058] In an example, the grammage of the material 2 according to the invention, comprising base paper 4 and coating 3, is between 35 and 90 gsm, or between 40 and 80 gsm, or between 45 and 75 gsm.

[0059] Advantageously, the grammage of the material 2 according to the invention, comprising base paper 4 and coating 3, is between 90 and 300 gsm, more preferably between 110 and 250 gsm, or between 150 and 200 gsm.

[0060] In another advantageous embodiment, the grammage of the base paper 4 is between 90 and 300 gsm, more preferably between 110 and 250 gsm, or be-

tween 150 and 200 gsm.

[0061] Advantageously, the grammage of the material 2 according to the invention, comprising base paper 4 and coating 3, is between 90 and 350 gsm, more preferably between 110 and 300 gsm, or between 150 and 250 gsm.

[0062] In an example, the platy coating pigment is substantially dry when it is applied as a coating 3 onto the base paper 4. In another example, the platy coating pigment is in the form of an aqueous mixture or a so-called slurry when applied as a coating 3 onto the base paper 4.

[0063] The coating preferably comprises less than 2 gsm or less than 1.5 gsm polymers, more preferably less than 1 or less than 0.5 gsm polymers, and most preferably less than 0.2 or less than 0.1 gsm plastic polymers, such as, for example, PLA, PE, PP, PCL, PEA, PHA, PHB, PHBH, CPLA, PBS, and/or AAC.

[0064] The properties of a mixture that comprises platy coating pigment, such as kaolin, and said coating binder(s), can be adjusted, for example by changing the thickness of the coating layer 3 so that the barrier properties of the coating 3 are typically improved when the thickness of the coating layer 3 is increased. Furthermore, the properties can be influenced, among other things, by changing the relative contents of the platy coating pigment and said coating binder(s). When the content of the platy coating pigment increases in relation to the content of the binder(s), the viscosity of the coating typically decreases and its porosity increases.

[0065] The relative proportion of one or more platy coating pigments in the total content of said one or more platy coating pigments and said coating binder(s) is at least 40 wt% (wherein the content of said binder(s) is not higher than 60 wt% of the total content of said one or more platy coating pigments and the binder(s)), more advantageously 45 to 80 wt% (wherein the content of the binder(s) is 20 to 55 wt%), and even more advantageously 50 to 70 wt% (wherein the content of said binder(s) is 30 to 50% of the total content of said one or more platy coating pigments and said binder(s)).

[0066] Advantageously, the amount of the pigment in the coating is between 40 and 85 dry wt%, or between 45 and 80 dry wt%, more preferably between 50 and 70 dry wt% or between 52 and 68 dry wt%.

[0067] Advantageously, the amount of the pigment in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d is between 40 and 85 dry wt%, or between 45 and 80 dry wt%, more preferably between 50 and 70 dry wt% or between 52 and 68 dry wt%.

[0068] Advantageously, the amount of said coating binder(s) (i.e. carboxymethyl cellulose (CMC) and/or starch having amylopectin content between 70 and 100 wt%, and/or nanofibrillar cellulose) in the first coating layer 3a, the second coating layer 3b, the third coating layer 3c and/or the fourth coating layer 3d, and/or in the coating is between 15 and 60 dry wt%, or between 20 and 55 dry wt%, more preferably between 30 and 50 dry wt%, or

between 32 and 48 dry wt%.

[0069] If the proportion of the coating binder(s) to the platy coating pigment is increased, it may be possible to reduce the total quantity of the coating 3 used. In a corresponding manner, if the proportion of the platy coating pigment to the binder(s) is increased, a thicker coating layer may be needed.

[0070] The pigment coating can be applied on one side of the base paper, or it can be applied on both sides of the base paper. The pigment coating may comprise a single coating layer, or it may comprise several coating layers, such as two, three or four coating layers. For coating the base paper, it is possible to use solutions of prior art, such as one or more of the following: blade coating, flooded nip application, nozzle application, short dwell time application, rod coating, air brush coating, film transfer coating, curtain coating, or spray coating. In an advantageous example, at least one coating layer is formed by film transfer coating, rod coating, or blade coating.

[0071] In an advantageous example, the content of the coating 3 in the material 2 is at least 1 gsm and not more than 7 gsm, more advantageously not more than 6 gsm or 5 gsm. Advantageously, the water vapour transmission rate (WVTR, 23°C, RH 50%) of the finished material is thus 80 to 400 gsm per day, for example 120 to 280 gsm per day. Advantageously, the grease resistance of the finished material, measured by the Oil Unger (60 s) method, is thus 1.3 to 2.5, for example 1.4 to 2.0. Advantageously, the water resistance of the finished material, measured by the Cobb (1800 s) test, is thus 20 to 45, for example 22 to 30. Advantageously, the KIT value of such material is thus 1 to 2. In an advantageous example, the ratio between the platy coating pigment the binder(s) is thus between 50:50 and 70:30. The material 2 having one or more of the above-mentioned properties may be suitable for the packaging of, for example, fresh bread.

[0072] In an advantageous example, the content of the coating 3 in the material 2 is 6 to 14 gsm, for example 8 to 12 gsm. Advantageously, the water vapour transmission rate (23°C, RH 50%) of the finished material 2 is thus 2 to 20 gsm per day, for example 3 to 12 gsm per day. Advantageously, the grease resistance of the material 2, measured by the Oil Unger (60 s) method, is thus 0.3 to 2.0, more preferably 0.3 to 1.0. Advantageously, the water resistance of the material 2, measured by the Cobb (1800 s) test, is thus 17 to 35, for example 18 to 25. In an example, the KIT value is thus 4 to 12, for example 5 to 10. In an advantageous example, the coating pigment to binder(s) ratio of such a material 2 is formed so that the content of the binder(s) is at least 40 wt% or at least 50 wt%. A material 2 having one or more of the above listed properties may be suitable for the packaging of bakery products, such as, for example, greasy and dry foodstuffs and/or greasy and moist foodstuffs. Such foodstuffs may include, for example, hamburgers or pastries. As the content of the coating 3 increases, the grease resistance of the material 2 is typically improved, which is useful, for example, in the packaging of greasy prod-

ucts.

[0073] The pigment coating according to the invention may also comprise other substances than one or more platy coating pigments and the binder(s). In an advantageous example, the total content of the platy coating pigment and the binder(s) in the coating 3 (calculated as dry substance) is at least 70 wt% or at least 75 wt%, more advantageously at least 80 wt% or at least 85 wt%, and most advantageously at least 90 wt% or at least 95 wt%. Preferably, the coating 3 consists totally or substantially totally of one or more platy coating pigments and said coating binder(s).

[0074] The coating material 2 according to the invention can be used for forming a food package 1. In an advantageous example, the food package 1 is a bag or has a substantially bag-like shape. The food package 1 may or may not also comprise one or more other materials 5 than the material 2 according to the invention, for example as a so-called "window". However, even in such a case, the content of the material 2 according to the invention is at least 50%, more advantageously at least 60% or at least 70%, and most advantageously at least 80% or at least 90% of the surface area of the outer layer of said food package 1.

[0075] In an example, the material 2 for packaging foodstuffs is used for packaging fresh bread. In another example, the material 2 for packaging foodstuffs is used for packaging bakery products, such as hamburgers or pastries. In a third example, the material 2 is used for packaging dry products, such as dried bread and/or crispbread.

[0076] The invention is not limited solely to the examples presented in Figs 1 to 2 and the above description, but it may be modified within the scope of the appended claims.

Claims

1. Material (2) suitable for packaging foodstuff, the material comprising paper, wherein said paper is base paper (4) coated on at least one side with a coating (3), which coating comprises
 - one or more platy coating pigments, and
 - binder comprising carboxymethyl cellulose (CMC), and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%,
 - and
 - the total dry weight of said platy coating pigment and said binder(s) contains 20 to 60 wt% of said binder(s), more preferably between 25 and 55 said binder(s), and
 - the total dry weight of said platy coating pigment and the binder(s) constitutes at least 70 wt% of said coating (3).

2. The material according to claim 1, wherein the base paper is coated on one side only.
3. The material according to claim 1 or 2, wherein the coating comprises 1 to 5 coating layers, and starch having amylopectin content between 70 and 100 wt% comprises at least 50 wt% of binders in at least one of the coating layers.
4. The material according to any of the preceding claims, wherein the coating comprises 1 to 5 coating layers, and carboxymethyl cellulose comprises at least 50 wt% of binders of at least one of the coating layers.
5. The material according to any of the preceding claims, wherein said platy coating pigment comprises at least 50 wt% of kaolin.
6. The material according to any of the preceding claims, wherein one binder comprises between 50 and 100 wt% of all binders in one coating layer.
7. The material according to any of the preceding claims, wherein the coating comprises at least 2 coating layers, from which at least one comprises nanofibrillar cellulose as the binder.
8. The material according to any of the preceding claims, wherein the content of the coating (3), in dry weight, is 1 to 17 g per m², more preferably between 3 and 14 g per m².
9. The material according to any of the preceding claims, wherein the content of the coating (3) in one coating layer, in dry weight, is 1 to 12 g per m², more preferably between 2 and 8 g per m².
10. The material according to any of the preceding claims, wherein the water vapour transmission rate of the material (2) at an air humidity of 50% and a temperature of 23°C is 80 to 400 g per m² per day, more preferably 120 to 280 g per m² per day.
11. The material according to claim 10, wherein the Cobb water resistance of the material (2) is 20 to 45.
12. The material according to any of the preceding claims 10 to 11, wherein the KIT value of the material (2) is 1 to 2.
13. The material according to any of the preceding claims 1 to 9, wherein the water vapour transmission rate of the material (2) at an air humidity of 50% and a temperature of 23°C is 2 to 20 g per m² per day, more preferably 3 to 12 g per m² per day.
14. The material according to claim 13, characterized

in that the Cobb water resistance of the material (2) is 17 to 35.

15. The material according to claim 13 or 14, wherein the KIT value of the material (2) is 4 to 12. 5
16. Food package comprising paper, wherein at least 50% of said food package (1) consists of material (2) in which base paper (4) has been coated on at least one side with a coating (3), the coating comprising 10
- one or more platy coating pigments, and
 - binder comprising carboxymethyl cellulose (CMC), and/or nanofibrillar cellulose, and/or starch having amylopectin content between 70 and 100 wt%, 15
- wherein
- the total dry weight of said platy coating pigment and said binder(s) contains 20 to 60 wt% of said binder(s), and 20
 - the total dry weight of said platy coating pigment and said binder(s) constitutes at least 70 wt% of said coating (3). 25

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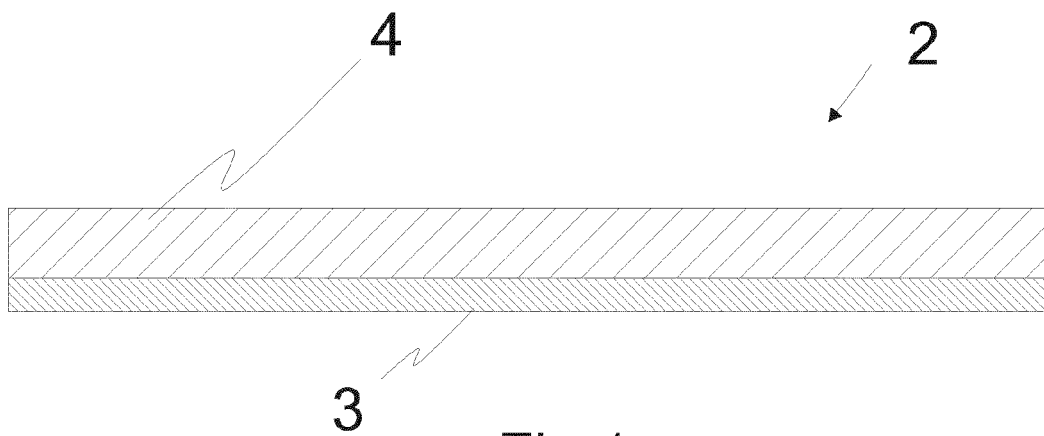


Fig.1a

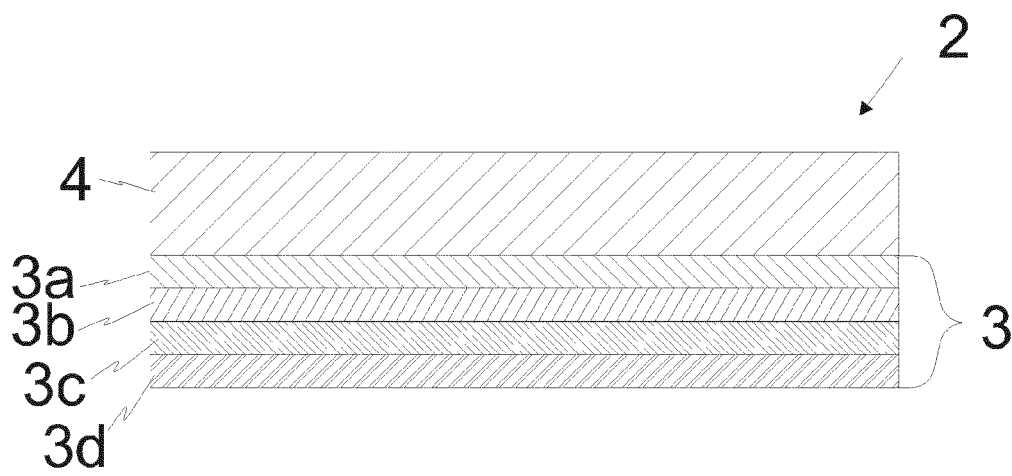


Fig.1b

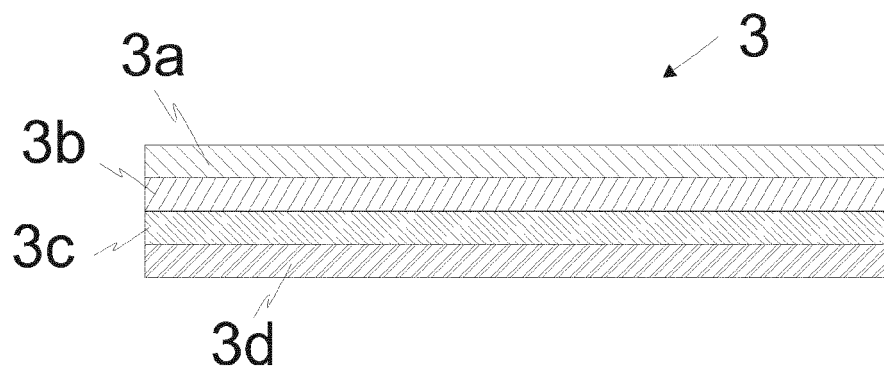


Fig.1c

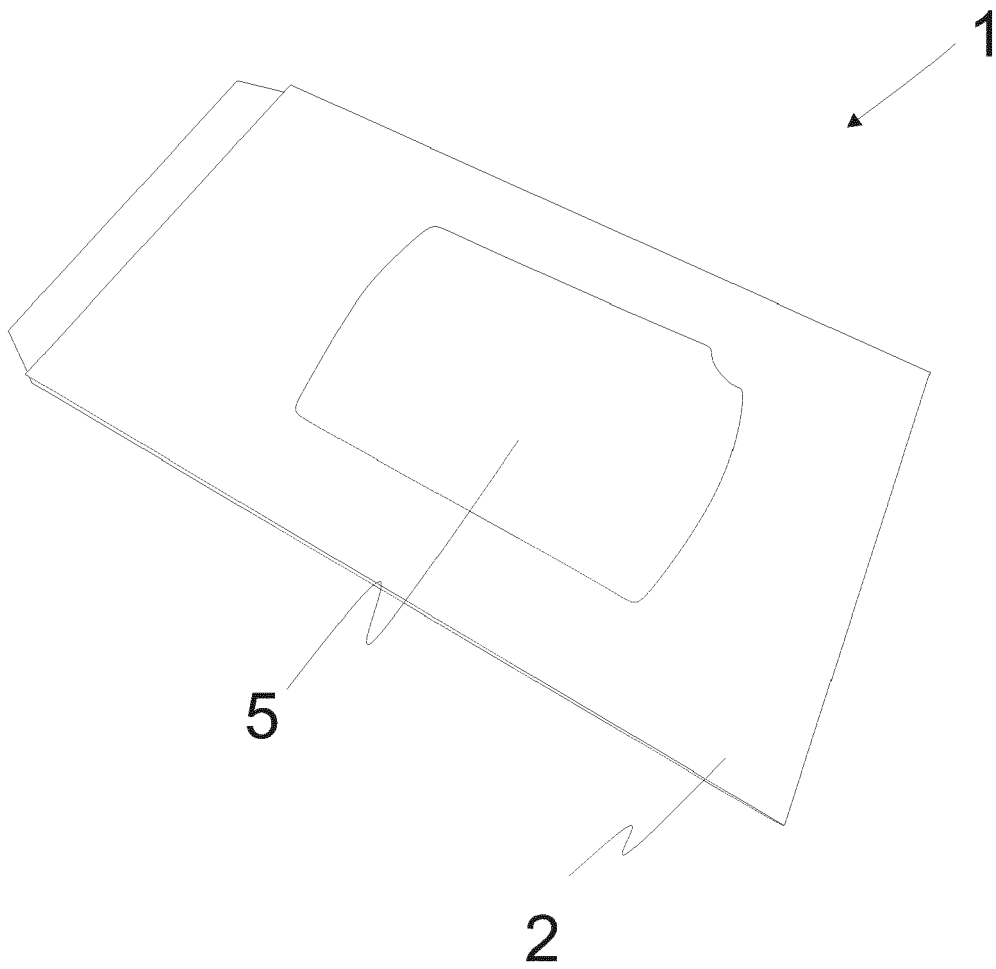


Fig.2



EUROPEAN SEARCH REPORT

Application Number
EP 13 39 7537

DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
X	WO 2012/066308 A2 (IMERYS MINERALS LTD [GB]; HUSBAND JOHN CLAUDE [GB]; SVENDING PER [SE];) 24 May 2012 (2012-05-24) * claims 1-24 *	1,5,16	INV. D21H27/10 D21H19/40 D21H19/44	
X	EP 1 743 976 A1 (SAPPI NETHERLANDS SERVICES BV [NL]) 17 January 2007 (2007-01-17) * paragraph [0152]; claims 1-33; figure 1 *	1-5		
X	GB 2 291 603 A (FUJI XEROX CO LTD [JP]) 31 January 1996 (1996-01-31) * claims 1-20; example 7 *	1,2,16		
A	WO 2012/044229 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]; OLSSON AASA [SE]) 5 April 2012 (2012-04-05) * the whole document *	1-16		
A	WO 2006/010927 A2 (ARJO WIGGINS FINE PAPERS LTD [GB]; BARCOCK RICHARD A [GB]; WARD-ASKEY) 2 February 2006 (2006-02-02) * the whole document *	1-16		TECHNICAL FIELDS SEARCHED (IPC)
A	US 2010/203318 A1 (GALEMBECK FERNANDO [BR] ET AL) 12 August 2010 (2010-08-12) * the whole document *	1-16		D21H
A	US 2012/114880 A1 (NAGOSHI MASANORI [JP] ET AL) 10 May 2012 (2012-05-10) * the whole document *	1-16		
A	WO 2006/053719 A1 (SAPPI NETHERLANDS SERVICES BV) 26 May 2006 (2006-05-26) * the whole document *	1-16		
		-/--		
The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 4 February 2014	Examiner Karlsson, Lennart	
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 P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				

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EUROPEAN SEARCH REPORT

Application Number
EP 13 39 7537

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2012/114917 A1 (ANDERSON DENNIS W [US] ET AL) 10 May 2012 (2012-05-10) * the whole document * -----	1-16	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 4 February 2014	Examiner Karlsson, Lennart
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 P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 39 7537

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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04-02-2014

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 2012066308	A2	24-05-2012	AU	2011330981 A1	02-05-2013
			CA	2817635 A1	24-05-2012
			CN	103210144 A	17-07-2013
			EP	2640893 A2	25-09-2013
			KR	20130096755 A	30-08-2013
			TW	201241268 A	16-10-2012
			US	2013280545 A1	24-10-2013
			WO	2012066308 A2	24-05-2012

EP 1743976	A1	17-01-2007	AT	487003 T	15-11-2010
			AU	2006268654 A1	18-01-2007
			CA	2614266 A1	18-01-2007
			CN	101228316 A	23-07-2008
			DK	1907626 T3	14-02-2011
			EA	200800035 A1	30-06-2008
			EP	1743976 A1	17-01-2007
			EP	1907626 A1	09-04-2008
			EP	2292838 A1	09-03-2011
			ES	2353819 T3	07-03-2011
			HK	1116840 A1	17-06-2011
			HR	P20110077 T1	31-03-2011
			JP	4970439 B2	04-07-2012
			JP	2009501283 A	15-01-2009
			KR	20080045129 A	22-05-2008
			PT	1907626 E	07-02-2011
			RS	51611 B	31-08-2011
			SI	1907626 T1	31-03-2011
			US	2009197005 A1	06-08-2009
			WO	2007006794 A1	18-01-2007
			ZA	200800263 A	26-08-2009

GB 2291603	A	31-01-1996	CA	2153205 A1	05-01-1996
			GB	2291603 A	31-01-1996
			US	5662995 A	02-09-1997

WO 2012044229	A1	05-04-2012	AR	083175 A1	06-02-2013
			AU	2011307594 A1	18-04-2013
			CA	2812531 A1	05-04-2012
			CN	103140425 A	05-06-2013
			EP	2621828 A1	07-08-2013
			US	2013192166 A1	01-08-2013
			WO	2012044229 A1	05-04-2012

WO 2006010927	A2	02-02-2006	AT	538248 T	15-01-2012
			BR	PI0513934 A	20-05-2008
			CA	2572813 A1	02-02-2006

EPO FORM P0459

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

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 39 7537

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The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-02-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		CN 1989298 A	27-06-2007
		EP 1771624 A2	11-04-2007
		ES 2378175 T3	09-04-2012
		PT 1771624 E	07-02-2012
		US 2008317963 A1	25-12-2008
		WO 2006010927 A2	02-02-2006

US 2010203318 A1	12-08-2010	AR 075381 A1	30-03-2011
		AU 2010213871 A1	08-09-2011
		CA 2752120 A1	19-08-2010
		CN 102362031 A	22-02-2012
		CO 6420364 A2	16-04-2012
		EA 201171041 A1	30-03-2012
		EP 2396471 A1	21-12-2011
		JP 2012517537 A	02-08-2012
		KR 20110106472 A	28-09-2011
		US 2010203318 A1	12-08-2010
		UY 32437 A	30-09-2010
		WO 2010093693 A1	19-08-2010

US 2012114880 A1	10-05-2012	CN 102470680 A	23-05-2012
		DE 112010002965 T5	11-10-2012
		JP 5285157 B2	11-09-2013
		US 2012114880 A1	10-05-2012
		WO 2011007775 A1	20-01-2011

WO 2006053719 A1	26-05-2006	AU 2005305982 A1	26-05-2006
		BR PI0516807 A	23-09-2008
		CA 2587506 A1	26-05-2006
		JP 2008520759 A	19-06-2008
		KR 20070085266 A	27-08-2007
		US 2009123768 A1	14-05-2009
		US 2011083573 A1	14-04-2011
		WO 2006053719 A1	26-05-2006

US 2012114917 A1	10-05-2012	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Non-patent literature cited in the description

- **KUTHCARLAPATI et al.** *Metals Materials and Processes*, 2008, vol. 20 (3), 307-314 **[0034]**