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(54) **CARPET BACKING BASED ON CARDED TECHNOLOGY**

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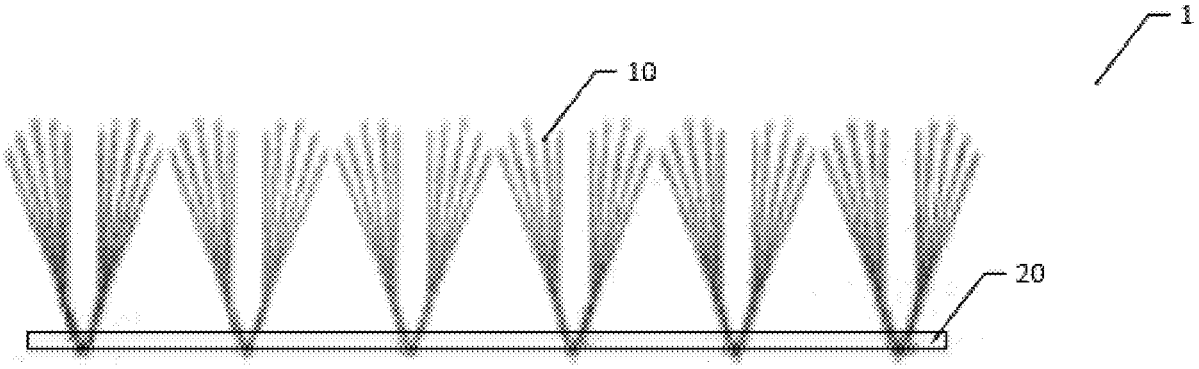
(57) **ABSTRACT**

A carpet backing material, such as a unitary carpet backing material or a primary carpet backing material, and carpet comprising the same, in which the carpet backing material comprises at least one thermally bonded carded (TBC) nonwoven layer comprising a plurality of carded staple fibers comprising a polymer constituent that is chemically the same as that of a secondary backing material, which improves recyclability of the carpet is provided.



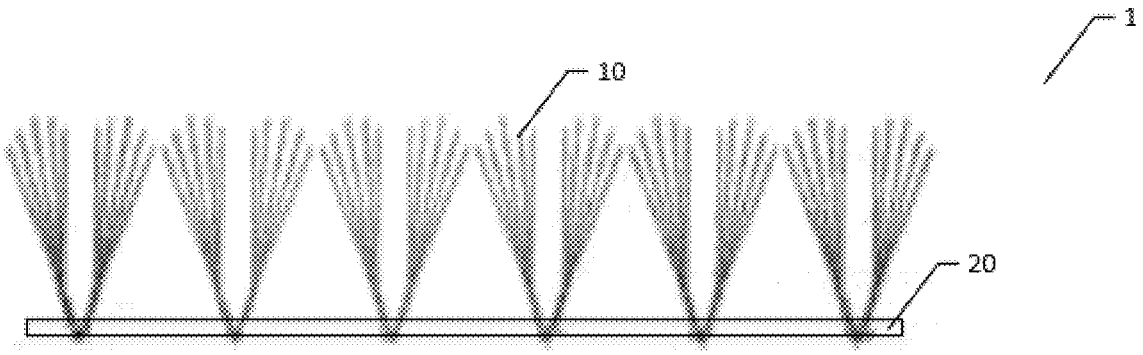


FIGURE 1

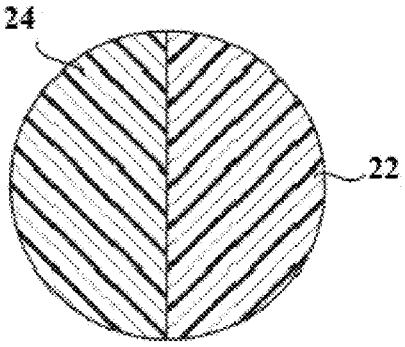


FIGURE 2

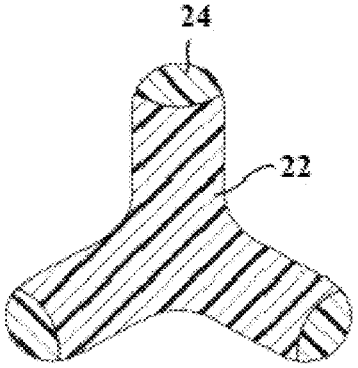


FIGURE 3

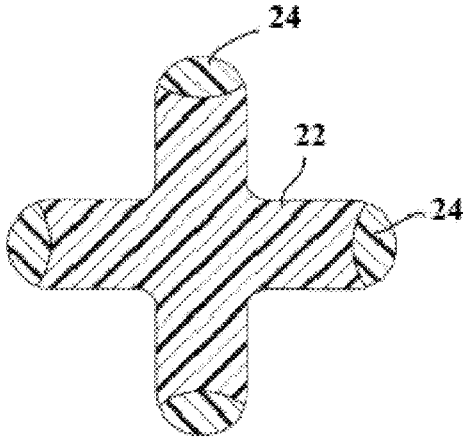


FIGURE 4

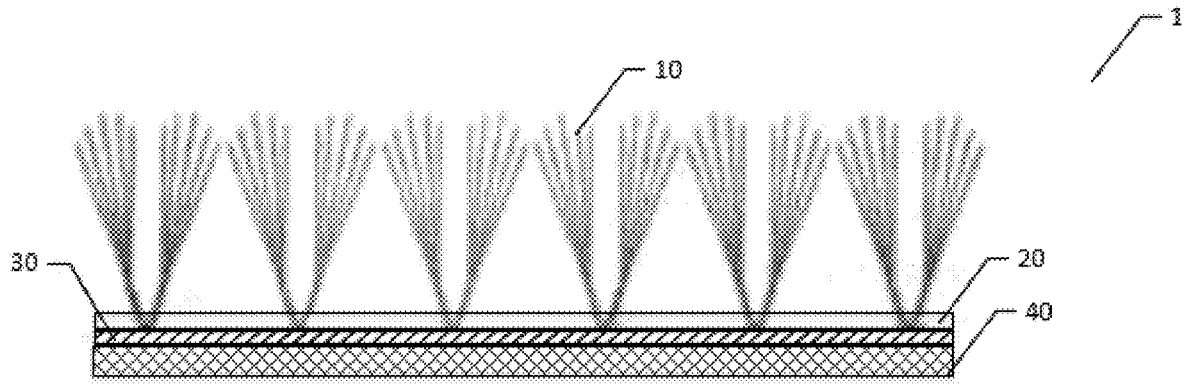


FIGURE 5

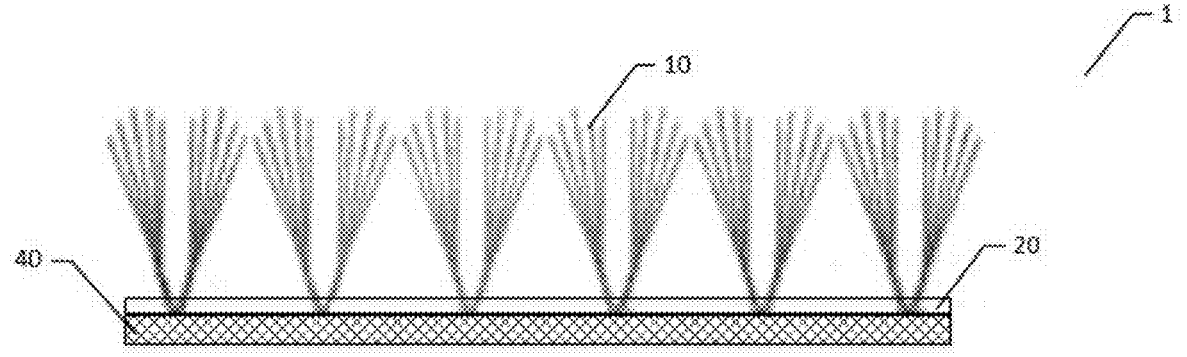


FIGURE 6

CARPET BACKING BASED ON CARDED TECHNOLOGY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. § 119 to U.S. Patent Application No. 63/446,919 filed Feb. 20, 2023, which is expressly incorporated by reference herein in its entirety.

TECHNICAL FIELD

[0002] Embodiments of the presently-disclosed invention relate generally to a carpet backing material, such as a unitary carpet backing material or a primary carpet backing material, and carpet comprising the same, in which the carpet backing material comprises at least one thermally bonded carded (TBC) nonwoven layer comprising a plurality of carded staple fibers comprising a polymer constituent that is chemically the same as that of a secondary backing material, which improves recyclability of the carpet.

BACKGROUND

[0003] In the manufacture of carpet (e.g., rolls or tiles), yarns are tufted or pushed through a primary backing material. Primary backing materials may be either woven or non-woven fabrics made of one or more natural or synthetic fibers or yarns. The tufts of yarn inserted into the primary backing material during the tufting process are usually held in place by untwisting of the yarn as well as shrinkage of the primary backing material. In the finishing operation, the backside or stitched surface of the primary backing material is usually coated with an adhesive, (e.g., a back-coat), such as a natural or synthetic rubber, resin latex, emulsion or a hot melt adhesive, to enhance locking or anchoring of the tufts to the primary backing material. Basic requirements for adhesives include the ability to bond strongly to the primary backing material, the tuft stitches protruding through its backside, and a secondary backing material that may be brought into contact with the adhesive under pressure. In this regard, the melting and subsequent cooling of the adhesive serves to bond the backing materials together. An alternative to carpet lamination processes using hot melt adhesives involves forming hot melt polymers or other thermoplastics into a continuous sheet or film and directing it between primary and secondary backing materials, heating the backing materials in contact with the molten thermoplastic adhesive, and then solidifying the hot melt adhesive to form a high strength laminate or composite.

[0004] The above-described methods for making carpet may present both process and environmental disadvantages. First, the adhesive layer may hinder the recycling of the used carpet and scrap product (e.g., salvage and off-spec carpet) because the adhesive may not be re-melted or re-used depending on the type of adhesive utilized. Additionally, the adhesive may cause sticking in molds and other recycling devices and release odors upon heating.

[0005] Traditional approaches to recycling and reuse have involved separating the individual components to be reused or settling with mixtures of components, which often render the recycled materials suitable for products of a lower quality. Separating individual components of multilayered products, while often more feasible than separating more homogeneous mixtures, can nevertheless present significant difficulties where the layers are held together with adhesive. Often, the separation processes render one or more of the components unusable or usable only after significant additional processing.

[0006] Therefore, there at least remains a need in the art for a unitary or primary backing material that case the cost and/or effort in recycling, in which a unitary or primary backing material may be formed entirely from the same polymer source (e.g., polymer constituent) and carpet including such a unitary backing material or a primary backing material and a secondary backing material each entirely formed from the chemically same polymer (e.g., same polymer constituents, such as a polypropylene). For instance, the entirety of the backing material, whether as a unitary or primary-and-secondary structure may contain only one polymer type.

SUMMARY OF INVENTION

[0007] One or more embodiments of the invention may address one or more of the aforementioned problems. Certain embodiments according to the invention provide a fibrous backing material comprising at least one thermally bonded carded (TBC) nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent; wherein the polymer constituent of each of the plurality of carded staple fibers is the same. In accordance with certain embodiments of the invention, the fibrous backing material may be a unitary backing material or a primary backing material, in which a secondary backing material may be formed from the same polymer type (e.g., polymer constituent) as the primary backing material.

[0008] In another aspect, the present invention provides a carpet comprising a plurality of carpet yarns tufted into and/or through a fibrous backing material comprising at least one TBC nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent, in which the polymer constituent of each of the plurality of carded staple fibers is the same.

[0009] In another aspect, the present invention provides a method of making a carpet, in which the method comprises tufting a plurality of carpet yarns into and/or through a fibrous backing material to provide a carpet as described and disclosed herein. The fibrous backing material comprises at least one TBC nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent, in which the polymer constituent of each of the plurality of carded staple fibers is the same. In accordance with certain embodiments of the invention, the fibrous backing material is a primary backing material, and the method further comprises indirectly or directly bonding a secondary backing material to the primary backing material.

BRIEF DESCRIPTION OF THE DRAWING(S)

[0010] The invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, this invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are

provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout, and wherein:

[0011] FIG. **1** illustrates a carpet yarn tufted through a fibrous backing material in accordance with certain embodiments of the invention;

[0012] FIG. **2** illustrates a cross-section of a bicomponent fiber having a side-by-side configuration in accordance with certain embodiments of the invention;

[0013] FIGS. **3** and **4** each illustrate a cross-section of a bicomponent fiber having a multi-lobal configuration in accordance with certain embodiments of the invention.

[0014] FIG. **5** illustrates a carpet having a carpet yarn tufted through a primary fibrous backing material, and a second backing material adhesively bonded to the primary backing material in accordance with certain embodiments of the invention; and

[0015] FIG. **6** illustrates a carpet having a carpet yarn tufted through a primary fibrous backing material, and a second backing material thermally bonded directly to the primary backing material (e.g., no adhesive between the backing materials) in accordance with certain embodiments of the invention.

DETAILED DESCRIPTION

[0016] The invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, this invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. As used in the specification, and in the appended claims, the singular forms "a", "an", "the", include plural referents unless the context clearly dictates otherwise.

[0017] The presently-disclosed invention relates generally to a carpet backing material, such as a unitary carpet backing material or a primary carpet backing material, and carpet comprising the same, in which the carpet backing material comprises at least one TBC nonwoven layer comprising a plurality of carded staple fibers comprising a polymer constituent that is chemically the same as that of a secondary backing material (when present), which improves recyclability of the carpet (e.g., carpet rolls, carpet tiles, or rugs). For instance the carpet backing material may comprise a fibrous backing material, such as a unitary or primary backing material. The fibrous backing material, for example, may be formed entirely from the same polymer source (e.g., polymer constituent) and carpet including such a unitary backing material or a primary backing material and a secondary backing material may each be entirely formed from the chemically same polymer(s) (e.g., same polymer constituents, such as a polypropylene). For instance, the entirety of the backing material, whether as a unitary or primary-and-secondary structure may contain only one polymer type, such as a polypropylene or a copolymer thereof.

[0018] In one aspect, the present invention provides a carpet comprising a plurality of carpet yarns tufted into and/or through a fibrous backing material comprising at least one TBC nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent, in which the polymer constituent of each of the plurality of carded staple fibers is the same. FIG. **1**, for instance, illustrates a carpet **1** including a carpet yarn **10** (or facing fiber) tufted through a fibrous backing material **20** in accordance with certain embodiments of the invention.

[0019] The at least one TBC nonwoven layer, in accordance with certain embodiments of the invention, may comprise from about 1 to about 10 individual TBC nonwoven layers thermally bonded together to define the fibrous backing material (e.g., a unitary backing material or a primary backing material), such as at least about any of the following: 1, 2, 3, 4, and 5 individual TBC nonwoven layers thermally bonded together, and/or at most about any of the following: 10, 9, 8, 7, 6, and 5 individual TBC nonwoven layers thermally bonded together individual TBC nonwoven layers thermally bonded together. Additionally or alternatively, the fibrous backing material may have a basis weight from about 20 to about 300 grams-per-square-meter (gsm), such as at least about any of the following: 20, 40, 60, 80, 100, 12, 140 and 160 gsm, and/or at most about any of the following: 300, 280, 260, 240, 220, 200, 180, and 160 gsm.

[0020] In accordance with certain embodiments of the invention, the plurality of carded staple fibers comprise monocomponent staple fibers. The monocomponent staple fibers, for example, may all be chemically identical (e.g., formed from the same polymer constituent, such as a polypropylene or copolymer thereof). In this regard, for example, all of the monocomponent staple fibers may have the same melting point, onset of softening, and/or degree of crystallinity.

[0021] Alternatively, the plurality of carded staple fibers may comprise a blend of a first portion of the monocomponent staple fibers comprising a first polymer component of the polymer constituent and a second portion of the monocomponent staple fibers comprising a second polymer component of the polymer constituent, in which the first polymer component is partially crystalline and serves as the matrix component and the second polymer component is amorphous and serves as the binder component. The fibrous backing material, however, may exhibit a single melting peak as evidenced by a differential scanning calorimetry (DSC) trace. For instance, the fibrous backing material may be produced from a single polymer system, such that all of the monocomponent staple fiber are formed from the same (i.e., identical) polymeric resin system. By way of example, a semi-crystalline polymer resin system that undergoes stress-induced crystallization in the fiber spinning process may be employed, in which the semi-crystalline polymer resin produces both amorphous fibers for bonding in the fibrous backing material and semi-crystalline fibers for strength. In this regard, each of the plurality of carded staple fibers are formed from the same polymer type, despite a portion of the carded staple fibers having an amorphous or lesser-degree of crystallinity compared to another portion of carded staple fibers having a higher-degree of crystallinity. By way of example, polymer intrinsic viscosity (IV), polymer throughput, spinning speed, melt temperatures, quench temperatures and flowrates are among the process variables that impact spinline stress and which can be utilized to provide the desired level of crystallinity in the fibers of the fibrous backing material. A crystallizable polymer in the uncrystallized or amorphous state can effectively form thermal bonds at relatively low temperatures, but after crystallization it is more difficult to thermally bond. The present

invention, in accordance with certain embodiments of the invention, exploits the results of these process variables to produce both the semi-crystalline fiber for strength and the amorphous fiber for thermal bonding. After thermal bonding, for instance, both fiber portions are present in the fibrous backing material in semi-crystalline or substantially crystalline state. For example, when both fiber portions are subjected to thermal bonding to form a consolidated fibrous backing material (e.g., fibers are bonded to one another) the amorphous second polymer component softens and fuses to form bonds with the first polymer component. During the bonding process, heat causes the binder to become tacky and fuse with itself and the matrix component of adjacent fibers at points of contact. Bonding also effects crystallization of the second polymer component so that in the resulting bonded nonwoven fabric both of the polymer components are at least partially crystalline, such that the fibrous backing material may exhibit a single melting peak as evidenced by a DSC trace. As noted above, the polymer constituent of plurality of carded staple fibers may be a single polymer system that forms the first portion of the monocomponent staple fibers comprising the first polymer component having stress-induced crystallization and the second portion of the monocomponent staple fibers comprising the second polymer component having a lower softening temperature than the first portion of monocomponent staple fibers.

[0022] In accordance with certain embodiments of the invention, the fibrous backing material may comprise from about 5 to about 95% by weight of the first portion of the monocomponent staple fibers, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight. Additionally or alternatively, the fibrous backing material comprises from about 5 to about 95% by weight of the second portion of the monocomponent staple fibers, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight.

[0023] In accordance with certain embodiments of the invention, the fibrous backing material is thermally area bonded. For example, at least one entire surface is subjected to an elevated temperature sufficient to form bond sites uniformly distributed throughout the area and/or the thickness of the fibrous backing material. Thermal area bonding, for instance, may be performed with one or more heated smooth calender rolls. Alternatively, the fibrous backing material may be thermally pattern bonded (e.g., a plurality of separate thermal bond sites) and have a bonded area from about 8 to about 50%, such as at least about any of the following: 8, 10, 12, 15, 18, 20, 22, 25, 28, and 30%, and/or at most about any of the following: 50, 45, 40, 35, and 30%.

[0024] In accordance with certain embodiments of the invention, the plurality of carded staple fibers may have an average linear density from about 1 to about 30 dtex, such as at least about any of the following: 1, 2, 4, 5, 6, 8, 10, 12, and 15 dtex, and/or at most about any of the following: 30, 28, 25, 22, 20, 18, and 15 dtex. For instance, the first portion of the monocomponent staple fibers (if a blend of staple fibers is used) has a first average linear density from about 1 to about 30 dtex, such as at least about any of the following: 1, 2, 4, 5, 6, 8, 10, 12, and 15 dtex, and/or at most about any of the following: 30, 28, 25, 22, 20, 18, and 15 dtex. Additionally or alternatively, the second portion of the monocomponent staple fibers (if a blend of staple fibers is used) has a second average linear density from about 1 to about 30 dtex, such as at least about any of the following: 1, 2, 4, 5, 6, 8, 10, 12, and 15 dtex, and/or at most about any of the following: 30, 28, 25, 22, 20, 18, and 15 dtex.

[0025] In accordance with certain embodiments of the invention, the plurality of carded staple fibers may comprise bicomponent staple fibers including the first polymer component (as discussed above) and the second polymer component (as discussed above) present in distinct portions of a cross section of the bicomponent staple fibers, and wherein the fibrous backing material exhibits a single melting peak as evidenced by a differential scanning calorimetry (DSC) trace. By way of example, the bicomponent staple fibers may have a sheath-core configuration, a side-by-side configuration, or a multi-lobal configuration. For example, the bicomponent staple fibers may have a sheath-core configuration wherein the first polymer component defines a core component that is surrounded by a sheath component defined by the second polymer component. In accordance with certain embodiments of the invention, the bicomponent staple fibers may have a multi-lobal configuration having, for example, from 3 to 8 lobes, such as at least about any of the following: 3, 4, or 5 lobes, and/or at most about any of the following: 8, 7, and 6 lobes. In accordance with certain embodiments of the invention, for example, the first polymer component may defines a central body portion and the second polymer component may be located in at least one tip of the lobes, such as from about 1 to about 25% of an outermost portion of the lobe, such as at least about any of the following: 1, 2, 3, 5, 8, and 10%, and/or at most about any of the following: 25, 20, 18, 15, 12, and 10%.

[0026] FIG. **2**, for example, illustrates a cross-section of a bicomponent fiber having a side-by-side configuration including a first side formed from the first polymer component 22 and a second side formed from the second polymer component 24. FIGS. 3 and 4 each illustrate a cross-section of a bicomponent fiber having a multi-lobal configuration in which the first polymer component 22 defines a central body portion and the second polymer component 24 is located or defines the outermost tip portions of the respective lobes.

[0027] In accordance with certain embodiments of the invention, the bicomponent staple fibers may comprise from about 5 to about 95% by weight of the first polymer component, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight. Additionally or alternatively, the bicomponent staple fibers may comprise from about 5 to about 95% by weight of the second polymer component, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight.

[0028] As noted above, the polymer component forming the plurality of carded staple fibers (e.g., monocomponent or bicomponent fibers) may be is a single polymer system (e.g., formed from the same polymer resin system) that forms the first polymer component having stress-induced crystallization and the second polymer component having a lower softening temperature than the first polymer component of the bicomponent staple fibers. In accordance with certain embodiments of the invention, the fibrous backing material is thermally area bonded. For example, at least one entire surface is subjected to an elevated temperature sufficient to form bond sites uniformly distributed throughout the area

and/or the thickness of the fibrous backing material. Thermal area bonding, for instance, may be performed with one or more heated smooth calender rolls. Alternatively, the fibrous backing material may be thermally pattern bonded (e.g., a plurality of separate thermal bond sites) and have a bonded area from about 8 to about 50%, such as at least about any of the following: 8, 10, 12, 15, 18, 20, 22, 25, 28, and 30%, and/or at most about any of the following: 50, 45, 40, 35, and 30%.

[0029] In accordance with certain embodiments of the invention, the bicomponent staple fibers (if present) have an average linear density from about 1 to about 30 dtex, such as at least about any of the following: 1, 2, 4, 5, 6, 8, 10, 12, and 15 dtex, and/or at most about any of the following: 30, 28, 25, 22, 20, 18, and 15 dtex.

[0030] In accordance with certain embodiments of the invention, the fibrous backing material comprises a combination of the monocomponent staple fibers and the bicomponent staple fibers. For instance, the fibrous backing material may comprise from about 5 to about 95% by weight of the monocomponent staple fibers, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight. Additionally or alternatively, the fibrous backing material may comprise from about 5 to about 95% by weight of the bicomponent staple fibers, such as at least about any of the following: 5, 10, 20, 30, 40, and 50% by weight, and/or at most about any of the following: 95, 90, 80, 70, 60, and 50% by weight. In accordance with certain embodiments of the invention, the fibrous backing material be formed entirely from monocomponent staple fibers or entirely from bicomponent staple fibers.

[0031] In accordance with certain embodiments of the invention, the polymer constituent may comprise a polyolefin, such as a polypropylene or copolymer thereof, and a polyethylene or copolymer thereof; a polyester, such as a polyester, such as a polyethylene terephthalate (PET), a polylactic acid, a polyamide, or any combinations thereof. For example, the polymer constituent may comprise from about 80 to about 100% by weight of a polyolefin, such as a polypropylene or copolymer thereof from at least about any of the following: 80, 95, 90, and 95% by weight, and/or at most about any of the following: 100, 99, 98, 97, 96, and 95% by weight.

[0032] In accordance with certain embodiments of the invention, the fibrous backing material is a primary backing material, and the carpet further comprises a secondary backing material bonded directly or indirectly to the primary backing material. For example, the secondary backing material may comprise a nonwoven fabric. The secondary backing material may comprise an identical chemical and structural configuration as the primary backing structure of any of the those described and disclosed herein. However, the structural configuration (e.g., fiber type, basis weight, linear density of the fibers, etc.) of the primary backing material and the secondary backing material do not need to be identical when employed in a carpet.

[0033] The secondary backing material, for example, may be indirectly bonded to the primary baking material via an adhesive layer located between and adjacent the primary backing material and the secondary backing material. By way of example only, the adhesive layer may comprise a latex adhesive, such as styrene butadiene rubber (SBR), or a vinyl acetate ether (VAE); a polyurethane adhesive; or a thermoplastic adhesive, such as a hotmelt adhesive, a polyolefin adhesive, or a polyvinyl chloride adhesive. In accordance with certain embodiments of the invention, the adhesive layer may have a basis weight from about 1 to about 20 gsm, such as at least about any of the following: 1, 3, 5, 8, and 10 gsm, and/or at most about any of the following: 20, 18, 15, 12, and 10 gsm.

[0034] FIG. **5**, for example, illustrates a carpet **1** having a carpet yarn **10** tufted through a primary fibrous backing material **20**, and a second backing material **40** adhesively bonded to the primary backing material via an adhesive layer **30** in accordance with certain embodiments of the invention.

[0035] In accordance with certain embodiments of the invention, the secondary backing material may directly bonded to the primary baking material via one or more thermal bonds. In this regard, the carpet may be devoid of an adhesive, such as between the primary backing material and the secondary backing material. FIG. **6**, for instance, illustrates a carpet **1** having a carpet yarn **10** tufted through a primary fibrous backing material **20**, and a second backing material **40** thermally bonded directly to the primary backing material (e.g., no adhesive between the backing materials) in accordance with certain embodiments of the invention.

[0036] In accordance with certain embodiments of the invention, the secondary backing material may comprise a spunbond nonwoven, a secondary TBC nonwoven, or a combination thereof. For instance, the secondary backing material may comprise a plurality of secondary fibers including (i) a secondary polymer constituent and (ii) an optional secondary additive constituent, in which the polymer constituent and the secondary polymer constituent are chemically the same (e.g., same polymer type, such as a polypropylene). Additionally or alternatively, the plurality of secondary fibers may have an average linear density from about 1 to about 30 dtex, such as at least about any of the following: 1, 2, 4, 5, 6, 8, 10, 12, and 15 dtex, and/or at most about any of the following: 30, 28, 25, 22, 20, 18, and 15 dtex. Additionally or alternatively, the secondary backing material may comprises monocomponent staple fibers, monocomponent spunbond fibers, bicomponent staple fibers, bicomponent spunbond fibers, or any combination thereof.

[0037] In accordance with certain embodiments of the invention, the secondary backing material is thermally area bonded. For example, at least one entire surface is subjected to an elevated temperature sufficient to form bond sites uniformly distributed throughout the area and/or the thickness of the secondary backing material. Thermal area bonding, for instance, may be performed with one or more heated smooth calender rolls. Alternatively, the secondary backing material may be thermally pattern bonded (e.g., a plurality of separate thermal bond sites) and have a bonded area from about 8 to about 50%, such as at least about any of the following: 8, 10, 12, 15, 18, 20, 22, 25, 28, and 30%, and/or at most about any of the following: 50, 45, 40, 35, and 30%.

[0038] In accordance with certain embodiments of the invention, the secondary backing material may have a basis weight from about 20 to about 300 grams-per-square-meter (gsm), such as at least about any of the following: 20, 40, 60, 80, 100, 12, 140 and 160 gsm, and/or at most about any of the following: 300, 280, 260, 240, 220, 200, 180, and 160 gsm.

[0039] In accordance with certain embodiments of the invention, the polymer constituent and the secondary polymer constituent are each a polyolefin or a copolymer thereof, such as a polypropylene or a polypropylene copolymer.

[0040] In another aspect, the present invention provides a method of making a carpet, in which the method comprises tufting a plurality of carpet yarns into and/or through a fibrous backing material to provide a carpet as described and disclosed herein. The fibrous backing material comprises at least one TBC nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent, in which the polymer constituent of each of the plurality of carded staple fibers is the same. In accordance with certain embodiments of the invention, the fibrous backing material is a primary backing material, and the method further comprises indirectly or directly bonding a secondary backing material to the primary backing material. In accordance with certain embodiments of the invention, the step of bonding the secondary backing material to the primary backing material comprises adhesively bonding the secondary backing material to the primary backing material. Alternatively, the step of bonding the secondary backing material to the primary backing material comprises thermally bonding the secondary backing material directly to the primary backing material, wherein an interface between the secondary backing material and the primary backing material is devoid of an adhesive.

[0041] These and other modifications and variations to the invention may be practiced by those of ordinary skill in the art without departing from the spirit and scope of the invention, which is more particularly set forth in the appended claims. In addition, it should be understood that aspects of the various embodiments may be interchanged in whole or in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and it is not intended to limit the invention as further described in such appended claims. Therefore, the spirit and scope of the appended claims should not be limited to the exemplary description of the versions contained herein.

What is claimed is:

1. A carpet, comprising: a plurality of carpet yarns tufted into and/or through a fibrous backing material comprising at least one thermally bonded carded (TBC) nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent; wherein the polymer constituent of each of the plurality of carded staple fibers is the same.

2. The carpet of claim **1**, wherein the at least one TBC nonwoven layer comprises from about **1** to about **10** individual TBC nonwoven layers thermally bonded together to define the fibrous backing material.

3. The carpet of claim **1**, wherein the fibrous backing material has a basis weight from about 20 to about 300 grams-per-square-meter (gsm).

4. The carpet of claim **1**, wherein fibrous backing material comprises a primary backing material or a unitary backing material.

5. The carpet of claim **1**, wherein the plurality of carded staple fibers comprise monocomponent staple fibers.

6. The carpet of claim **5**, wherein the plurality of carded staple fibers comprises a blend of a first portion of the monocomponent staple fibers comprising a first polymer component of the polymer constituent and a second portion of the monocomponent staple fibers comprising a second polymer component of the polymer constituent, wherein the first polymer component is partially crystalline and serves as the matrix component and the second polymer component is amorphous and serves as the binder component, and wherein the fibrous backing material exhibits a single melting peak as evidenced by a differential scanning calorimetry (DSC) trace.

7. The carpet of claim **6**, wherein the polymer constituent is a single polymer system that forms the first portion of the monocomponent staple fibers comprising the first polymer component having stress-induced crystallization and the second portion of the monocomponent staple fibers comprising the second polymer component having a lower softening temperature than the first portion of monocomponent staple fibers.

8. The carpet of claim **1**, wherein the fibrous backing material is thermally area bonded.

9. The carpet of claim **1**, wherein the fibrous backing material is thermally pattern bonded and has a bonded area from about 8 to about 50%.

10. The carpet of claim **1**, wherein the plurality of carded staple fibers comprise bicomponent staple fibers including the first polymer component and the second polymer component present in distinct portions of a cross section of the bicomponent staple fibers, and wherein the fibrous backing material exhibits a single melting peak as evidenced by a differential scanning calorimetry (DSC) trace.

11. The carpet of claim **10**, wherein the bicomponent staple fibers have a sheath-core configuration, a side-by-side configuration, or a multi-lobal configuration.

12. The carpet of claim **10**, wherein the polymer constituent is a single polymer system that forms the first polymer component having stress-induced crystallization and the second polymer component having a lower softening temperature than the first polymer component of the bicomponent staple fibers.

13. The carpet of claim **1**, wherein the polymer constituent comprises a a polypropylene or copolymer thereof, a polyethylene or copolymer thereof a polyester, a polylactic acid, a polyamide, or any combination thereof.

14. The carpet of claim **1**, wherein the fibrous backing material is a primary backing material, and the carpet further comprises a secondary backing material bonded directly or indirectly to the primary backing material, wherein the secondary backing material comprises a nonwoven fabric.

15. The carpet of claim **14**, wherein the secondary backing material is indirectly bonded to the primary baking material via an adhesive layer located between and adjacent the primary backing material and the secondary backing material or directly bonded to the primary baking material via one or more thermal bonds.

16. The carpet of claim **15**, wherein the secondary backing material comprises a spunbond nonwoven, a secondary TBC nonwoven, or a combination thereof.

17. A method of making a carpet, comprising: tufting a plurality of carpet yarns into and/or through a fibrous backing material to provide a carpet, the fibrous backing material comprising at least one thermally bonded carded (TBC) nonwoven layer comprising a plurality of carded staple fibers including (i) a polymer constituent and (ii) an optional additive constituent; wherein the polymer constituent of each of the plurality of carded staple fibers is the same.

18. The method of claim **17**, wherein the fibrous backing material is a primary backing material, and the method further comprises bonding a secondary backing material to the primary backing material.

19. The method of claim **17**, wherein bonding the secondary backing material to the primary backing material comprises adhesively bonding the secondary backing material to the primary backing material.

20. The method of claim **17**, wherein bonding the secondary backing material to the primary backing material comprises thermally bonding the secondary backing material directly to the primary backing material, wherein an interface between the secondary backing material and the primary backing material is devoid of an adhesive.

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