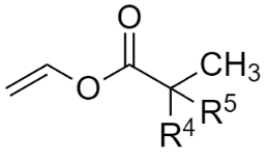
CLAIMS

What is claimed is:

1. A hotmelt adhesive composition comprising:
   a polymer produced from ethylene, one or more branched vinyl ester monomers, and optionally, vinyl acetate; and
   a tackifier 

   ,
   wherein R^4 and R^5 have a combined carbon number of 7.

2. The hot melt adhesive composition of claim 1, further comprising a secondary polymer at an amount that ranges from 0.1 to 90 wt% of the hot melt adhesive composition.

3. The hot melt adhesive composition of claim 2, wherein the secondary polymer is selected from a group consisting of EVA, ethylene-acrylic ester copolymers, polyethylene, polypropylene, styrene block copolymers, and combinations thereof.

4. The hotmelt adhesive composition of claim 1, wherein the polymer has a number average molecular weight ranging from 5 to 10,000 kDa, and a molecular weight distribution ranging from 1 to 60, obtained by GPC.

5. The hotmelt adhesive composition of claim 1, further comprising a wax and/or an antioxidant.

6. The hotmelt adhesive composition of claim 1, wherein the polymer is a copolymer consisting of ethylene and one or more branched vinyl ester or a terpolymer consisting of ethylene, the one or more branched vinyl ester and vinyl acetate.
7. The hotmelt adhesive composition of claim 1, wherein the polymer has:
   an ethylene content ranging from 10 to 99.99 wt%,
   a branched vinyl ester content ranging from 0.01 to 90 wt% and optionally,
   a vinyl acetate content ranging from 0.01 to 89.99 wt% .

8. The hotmelt adhesive composition of claim 1, wherein the polymer is polymerized under conditions comprising a reactor pressure of greater than 1000 bar and a reactor temperature of greater than 50 °C

9. The hotmelt adhesive composition of claim 1, wherein according to ASTM D3418:
   a melting temperature of the polymer ranges from 0 to 150 °C,
   a crystallization temperature of the polymer ranges from 0 to 150 °C, and/or
   a heat of crystallization of the polymer, according to ASTM D3418, ranges from 0 to 280 J/g.

10. The hotmelt adhesive composition of claim 1, wherein the polymer has a storage modulus at 0 °C in a range from 0.1 MPa to 10 GPa.

11. The hotmelt adhesive composition of claim 1, wherein a melt flow rate (MFR) of the polymer according to ASTM D1238 at 190 ºC/2.16 kg ranges from 0.01 g/10 min to 1000 g/10 min.

12. The hotmelt adhesive composition of claim 1, wherein a density of the polymer according to ASTM D792 ranges from of 0.85 g/cm^3 to 1.5 g/cm^3.

13. The hotmelt adhesive composition of claim 1, wherein a bio-based carbon content of the polymer according to ASTM D6866-18 ranges from of 1% to 100%.

14. The hotmelt adhesive composition of claim 1, wherein:
    the polymer is present at an amount ranging from 10 wt% to 90 wt% of the hotmelt adhesive composition, and
    the tackifier is present at an amount ranging from 10 wt% to 90 wt% of the hotmelt adhesive composition.

15. The hotmelt adhesive composition of claim 1, wherein a viscosity according to ASTM D1084-08 at 150 ºC ranges from 300 cPs to 20000 cPs.

16. The hotmelt adhesive composition of claim 1, wherein a viscosity according to ASTM D1084-08 at 177 ºC ranges from 300 cPs to 10000 cPs.

17. The hotmelt adhesive composition of any of the above claims, wherein a molten Garner color according to ASTM D1544-04 ranges from 1 to 7.

18. The hotmelt adhesive composition of claim 1, wherein:

a peel adhesion fail temperature (PAFT) according to ASTM D4498-07 at 100 gram is at least 40 ^{o}C, and/or

a shear adhesion fail temperature (SAFT) according to ASTM D4498-07 at 500 gram is at least 70 ^{o}C.

19. The hotmelt adhesive composition of claim 1, wherein a cloud point according to ASTM D6038 ranges from 30 ^{o}C to 140 ^{o}C or does not exist.

20. The hotmelt adhesive composition of any of the above claims, wherein according to ASTM D4499:

a 100-hour viscosity at 177 ^{o}C ranges from 300 cPs to 10000 cPs,

a 100-hour color ranges from 3 to 17, and/or

an absolute value of a 100-hour percent viscosity change ranges from 0% to 70%.

21. The hotmelt adhesive composition of any of the above claims, wherein according to ASTM D4499:

a 200-hour viscosity at 177 ^{o}C ranges from 300 cPs to 10000 cPs,

a 200-hour color according to ASTM D4499 ranges from 3 to 17, and/or

an absolute value of a 200-hour percent viscosity change according to ASTM D4499 ranges from 0% to 70%.

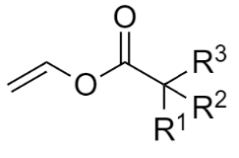
22. A method for producing a hotmelt adhesive composition comprising:

adding a polymer produced from ethylene, one or more branched vinyl ester monomers, and optionally, vinyl acetate and a tackifier into a mixer;

optionally adding a wax and/or an antioxidant into the mixer; and

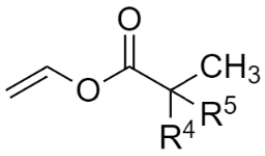
mixing the polymer and the tackifier, and the optional wax and/or antioxidant at a temperature in a range from 110 ^{o}C to 220 ^{o}C to form the hotmelt adhesive composition,

wherein the one or more branched vinyl ester monomers have the general structure (I) or the general structure (II):



(I)

wherein R1, R2, and R3 have a combioned carbon number of 3 to 20,



(II),

wherein R^4 and R^5 have a combined carbon number of 7.

23. A method for bonding a substrate to a similar or dissimilar substrate comprising:
applying the hotmelt adhesive composition of claim 1 to at least one substrate; and
bonding the at least one substrate and the hotmelt adhesive composition together.

24. A multi-layer article, comprising:
at least one layer of the hotmelt adhesive composition of claim 1 and one or more substrate layers.