CLAIMS

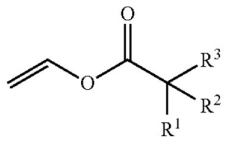
What is claimed is:

1. A hotmelt adhesive composition comprising:

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

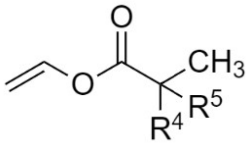
   a tackifier ,

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



(I),

   wherein R^1, R^2, and R^3 have a combined carbon number of 3 to 20,



(II),

   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 ºC, and/or
    a shear adhesion fail temperature (SAFT) according to ASTM D4498-07 at 500 gram is at least 70 ºC.

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

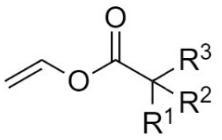
20. The hotmelt adhesive composition of any of the above claims, wherein according to ASTM D4499:
    a 100-hour viscosity at 177 ºC ranges from 300 cPs to 10000 cPs,
    a 100-hour color ranges from 3 to 17, and/or
    an absolute value of a 100-hour percent viscosity change ranges from 0% to 70%.

21. The hotmelt adhesive composition of any of the above claims, wherein according to ASTM D4499:
    a 200-hour viscosity at 177 ºC 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

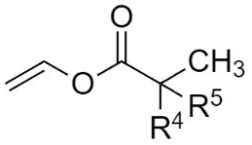
mixing the polymer and the tackifier, and the optional wax and/or antioxidant at a temperature in a range from 110 °C to 220 °C to form the hotmelt adhesive composition,

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.