CLAIMS

1. A double-sided multi-layer adhesive comprising:

at least two layers of pressure sensitive adhesive with no intervening layers between the pressure sensitive adhesive layers,

the first layer comprising a first pressure sensitive adhesive composition; and

the second layer comprising a second pressure sensitive adhesive composition comprising a cured mixture formed from a reactive mixture comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, or a non-siloxane containing segmented urethane-based unit, wherein the reactive mixture is coated to form a layer prior to curing.

2. The double-sided multi-layer adhesive of claim 1, wherein B comprises a non-siloxane containing segmented urea-based unit that comprises at least one urea group and at least one oxyalkylene group.

3. The double-sided multi-layer adhesive of claim 2, wherein the X-B-X reactive oligomer is the reaction product of a non-siloxane segmented urea-based diamine and a Z-X material, wherein X comprises an ethylenically unsaturated group, and Z comprises an amine-reactive group.

4. The double-sided multi-layer adhesive of claim 3, wherein the non-siloxane segmented urea-based diamine is the reaction product of a polyoxyalkylene diamine with a diaryl carbonate.

5. The double-sided multi-layer adhesive of claim 3, wherein Z comprises an isocyanate, an azlactone, an anhydride or a combination thereof.

6. The double-sided multi-layer adhesive of claim 1, wherein the X-B-X reactive oligomer is the reaction product of a non-siloxane segmented urea-based diamine and a Z-W-Z material,

wherein Z comprises an amine-reactive group and W comprises a linking group, followed by the reaction with a Y-X material wherein X comprises an ethylenically unsaturated group, and Y comprises an Z-reactive group.

7. The double-sided multi-layer adhesive of claim 6, wherein Z-W-Z comprises a diisocyanate and Y-X comprises a hydroxyl-functional (meth)acrylate.

8. The double-sided multi-layer adhesive of claim 1, wherein the adhesive is an optically clear adhesive.

9. The double-sided multi-layer adhesive of claim 1, wherein the first layer is a self-wetting and removable adhesive.

10. The double-sided multi-layer adhesive of claim 1, wherein at least one layer is a microstructured adhesive.

11. The double-sided multi-layer adhesive of claim 1, wherein the cured mixture further comprises an ethylenically unsaturated material.

12. The double-sided multi-layer adhesive of claim 1, wherein at least one of the first layer or the second layer further comprises an additive, wherein the additive comprises a pressure sensitive adhesive, a plasticizing agent, a tackifying agent, a UV stabilizer, an environmental stabilizer, or mixture thereof.

13. The double-sided multi-layer adhesive of claim 2, wherein the first layer pressure sensitive adhesive composition comprises 5-60 weight % of cured reaction mixture and 5-55 weight % plasticizer.

14. The double-sided multi-layer adhesive of claim 1, wherein B comprises a non-siloxane segmented urethane-based unit that comprises at least one urethane group and at least one oxyalkylene group.

15. The double-sided multi-layer adhesive of claim 1, wherein X-B-X comprises a siloxane diacrylate.

16. The double-sided multi-layer adhesive of claim 1, wherein the second layer comprises poly(meth)acrylate, a siloxane, or a siloxane (meth)acrylate.

17. The double-sided multi-layer adhesive of claim 1, wherein the second layer has a 180° Peel Strength which is less than the 180° Peel Strength of the first layer as measured by ASTM test method D 3330-90.

18. A method of preparing a double-sided multi-layer adhesive comprising:

providing a first fluid comprising a polymeric adhesive composition solution or dispersion;

providing a second fluid comprising a curable composition comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, a non-siloxane containing segmented urethane-based unit, or a siloxane-based unit, and an initiator;

coating the first fluid and the second fluid onto a substrate; and

curing the curable composition.

19. The method of claim 18, wherein coating the first fluid and the second fluid onto a substrate comprises simultaneous slot die coating of the two fluids.

20. The method of claim 19, wherein the second fluid is coated over a coating of the first fluid.

21. The method of claim 18, wherein the polymeric adhesive composition comprises a pressure sensitive adhesive.

22. The method of claim 18, wherein the substrate comprises a release liner.

23. The method of claim 18, wherein the curable composition further comprises a pressure sensitive adhesive, a plasticizing agent, a tackifying agent or mixture thereof.

24. An adhesive article comprising:

a double-sided multi-layer adhesive comprising at least two layers of pressure sensitive adhesive,

the first layer comprising a first pressure sensitive adhesive; and

the second layer comprising:

a pressure sensitive adhesive comprising a cured mixture comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, or a non-siloxane containing urethane-based unit; and

a substrate.

25. The adhesive article of claim 24, wherein the substrate comprises an optically active film comprising a visible mirror film, a color mirror film, a solar reflective film, a diffusive film, an infrared reflective film, an ultraviolet reflective film, a reflective polarizer film such as a brightness enhancement film or a dual brightness enhancement film, an absorptive polarizer film, an optically clear film, a tinted film, or an antireflective film.

CLAIMS

1. A double-sided multi-layer adhesive comprising:

at least two layers of pressure sensitive adhesive with no intervening layers between the pressure sensitive adhesive layers,

the first layer comprising a first pressure sensitive adhesive composition; and

the second layer comprising a second pressure sensitive adhesive composition comprising a cured mixture formed from a reactive mixture comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, or a non-siloxane containing segmented urethane-based unit, wherein the reactive mixture is coated to form a layer prior to curing, and wherein the second pressure sensitive adhesive layer has different properties from the first pressure sensitive layer.

2. The double-sided multi-layer adhesive of claim 1, wherein B comprises a non-siloxane containing segmented urea-based unit that comprises at least one urea group and at least one oxyalkylene group.

3. The double-sided multi-layer adhesive of claim 2, wherein the X-B-X reactive oligomer is the reaction product of a non-siloxane segmented urea-based diamine and a Z-X material, wherein X comprises an ethylenically unsaturated group, and Z comprises an amine-reactive group.

4. The double-sided multi-layer adhesive of claim 3, wherein the non-siloxane segmented urea-based diamine is the reaction product of a polyoxyalkylene diamine with a diaryl carbonate.

5. The double-sided multi-layer adhesive of claim 3, wherein Z comprises an isocyanate, an azlactone, an anhydride or a combination thereof.

6. The double-sided multi-layer adhesive of claim 1, wherein the X-B-X reactive oligomer is the

reaction product of a non-siloxane segmented urea-based diamine and a Z-W-Z material, wherein Z comprises an amine-reactive group and W comprises a linking group, followed by the reaction with a Y-X material wherein X comprises an ethylenically unsaturated group, and Y comprises an Z-reactive group.

7. The double-sided multi-layer adhesive of claim 6, wherein Z-W-Z comprises a diisocyanate and Y-X comprises a hydroxyl-functional (meth)acrylate.

8. The double-sided multi-layer adhesive of claim 1, wherein the adhesive is an optically clear adhesive.

9. The double-sided multi-layer adhesive of claim 1, wherein the first layer is a self-wetting and removable adhesive.

10. The double-sided multi-layer adhesive of claim 1, wherein at least one layer is a microstructured adhesive.

11. The double-sided multi-layer adhesive of claim 1, wherein the cured mixture further comprises an ethylenically unsaturated material.

12. The double-sided multi-layer adhesive of claim 1, wherein at least one of the first layer or the second layer further comprises an additive, wherein the additive comprises a pressure sensitive adhesive, a plasticizing agent, a tackifying agent, a UV stabilizer, an environmental stabilizer, or mixture thereof.

13. The double-sided multi-layer adhesive of claim 2, wherein the first layer pressure sensitive adhesive composition comprises 5-60 weight % of cured reaction mixture and 5-55 weight % plasticizer.

14. The double-sided multi-layer adhesive of claim 1, wherein B comprises a non-siloxane

segmented urethane-based unit that comprises at least one urethane group and at least one oxyalkylene group.

15. The double-sided multi-layer adhesive of claim 1, wherein X-B-X comprises a siloxane diacrylate.

16. The double-sided multi-layer adhesive of claim 1, wherein the second layer comprises poly(meth)acrylate, a siloxane, or a siloxane (meth)acrylate.

17. The double-sided multi-layer adhesive of claim 1, wherein the second layer has a 180° Peel Strength which is less than the 180° Peel Strength of the first layer as measured by ASTM test method D 3330-90.

18. A method of preparing a double-sided multi-layer adhesive comprising:

providing a first fluid comprising a polymeric adhesive composition solution or dispersion;

providing a second fluid comprising a curable composition comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, a non-siloxane containing segmented urethane-based unit, or a siloxane-based unit, and an initiator;

coating the first fluid and the second fluid onto a substrate; and

curing the curable composition, and wherein the second fluid has different properties from the first fluid.

19. The method of claim 18, wherein coating the first fluid and the second fluid onto a substrate comprises simultaneous slot die coating of the two fluids.

20. The method of claim 19, wherein the second fluid is coated over a coating of the first fluid.

21. The method of claim 18, wherein the polymeric adhesive composition comprises a pressure sensitive adhesive.

22. The method of claim 18, wherein the substrate comprises a release liner.

23. The method of claim 18, wherein the curable composition further comprises a pressure sensitive adhesive, a plasticizing agent, a tackifying agent or mixture thereof.

24. An adhesive article comprising:

a double-sided multi-layer adhesive comprising at least two layers of pressure sensitive adhesive,

the first layer comprising a first pressure sensitive adhesive; and

the second layer comprising:

a pressure sensitive adhesive comprising a cured mixture comprising:

at least one X-B-X reactive oligomer, wherein X comprises an ethylenically unsaturated group, and B comprises a non-siloxane containing segmented urea-based unit, or a non-siloxane containing urethane-based unit; and

a substrate.

25. The adhesive article of claim 24, wherein the substrate comprises an optically active film comprising a visible mirror film, a color mirror film, a solar reflective film, a diffusive film, an infrared reflective film, an ultraviolet reflective film, a reflective polarizer film such as a brightness enhancement film or a dual brightness enhancement film, an absorptive polarizer film, an optically clear film, a tinted film, or an antireflective film.