We claim:

1. A styrenic resin comprising not more than 5 weight percent of moieties other than styrenic moieties, said styrenic resin having -

(a) a Ring & Ball softening point of at least 70°C;

(b) a z-average molecular weight (Mz) of not more than 3,500 dalton; and

(c) a polydispersity index of not more than 2.0.

2. The resin of claim 1, wherein said Ring & Ball softening point is at least 80°C, said z-average molecular weight is not more than 3,000 dalton, and said polydispersity index is not more than 1.9.

3. The resin of claim 1, wherein said styrenic resin is an at least partially hydrogenated polystyrene resin having an aromatic hydrogen content of not more than 15 percent, as measured by proton NMR.

4. The resin of claim 1, wherein said Ring & Ball softening point is at least 85°C and not more than 110°C, said z-average molecular weight is not more than 2,300 dalton, and said polydispersity index is not more than 1.7.

5. The resin of claim 1, further comprising less than 2 weight percent of moieties other than styrenic moieties.

6. An adhesive composition comprising said styrenic resin of claim 1.

7. A tire comprising said styrenic resin of claim 1.

8. An adhesive composition comprising:

(a) at least 15 weight percent and not more than 85 weight percent of one or more adhesive base polymers;

(b) at least 5 weight percent and not more than 75 weight percent of a tackifier;

(c) not more than 35 weight percent of an oil;

(d) not more than 40 weight percent of one or more waxes; and

(e) not more than 10 weight percent of one or more additional components,

wherein said tackifier comprises a styrenic resin having a Ring & Ball softening point of at least 70°C and not more than 125°C, a z-average molecular weight (Mz) of not more than 4,000 dalton, and a polydispersity index of not more than 2.0, wherein said styrenic resin is an at least partially hydrogenated polystyrene resin comprising not more than 5 weight percent of moieties other than styrenic moieties.

9. The composition of claim 8, wherein said styrenic resin is an at least partially hydrogenated styrene resin having an aromatic hydrogen content of less than 15 percent.

10. The composition of claim 8, wherein said adhesive is a hot melt nonwoven adhesive composition comprising at least 15 weight percent and not more than 35 weight percent of said one or more adhesive base polymers, at least 1 weight percent and not more than 30 weight percent of said oil, and at least 10 weight percent and not more than 70 weight percent of said tackifier, wherein said one or more adhesive base polymers is selected from the group consisting of EVA, styrenic block copolymers, metallocene-catalyzed olefinic polymers, amorphous polyalphaolefins (APAOs), and combinations thereof.

11. The composition of claim 8, wherein said adhesive composition is a hot melt packaging adhesive comprising at least 25 weight percent and not more than 80 weight percent of said one or more adhesive base polymers, at least 5 weight percent and not more than 55 weight percent of said tackifier, and at least 1 weight percent and not more than 50 weight percent of said one or more waxes, wherein said one or more adhesive base polymers is selected from the group consisting of styrenic block copolymers, olefinic block copolymers, metallocene-catalyzed olefinic polymers, amorphous polyalphaolefins (APAOs), and combinations thereof.

12. The composition of claim 8, further comprising at least about 1 weight percent and not more than about 20 weight percent of an unhydrogenated polystyrene resin.

We Claim:

1. A process for producing a polystyrene homopolymer resin, said process comprising:

(a) combining at least a solid acid catalyst, an inert solvent, and styrene to thereby form a reaction mixture; and

(b) polymerizing at least a portion of said styrene in said reaction mixture to thereby produce said polystyrene homopolymer resin having a Ring & Ball softening point of at least 85°C and not more than 110°C, a z-average molecular weight (Mz) from about 500 dalton to not more than about 3,000 dalton, and a polydispersity index from about 1.1 to not more than 1.7,

wherein said inert solvent has an aromatic hydrogen content of not more than 10 percent, as measured by proton NMR; and

wherein said polystyrene homopolymer resin comprises styrenic moieties having not more than 5 weight percent of end-group moieties other than styrenic moieties.

2. The process of claim 1, wherein said inert solvent has an aromatic hydrogen content of not more than 5 percent, wherein said inert solvent comprises one or more cycloaliphatic hydrocarbon compounds.

3. The process of claim 1, wherein said weight ratio of said inert solvent to said styrene in said reaction mixture is at least 30:70.

4. The process of claim 1, wherein during said polymerizing of step (b), the temperature of said reaction mixture changes by not more than 5°C, wherein said average reaction temperature is at least 50°C.

5. The process of claim 1, wherein said polymerizing of step (b) is carried out at a reaction temperature of at least 40°C and not more than 105°C.

6. The process of claim 1, wherein said combining of step (a) includes introducing said styrene into a pre-mixed slurry of said solid acid catalyst and said inert solvent to thereby form said reaction mixture.

7. The process of claim 1, wherein said reaction mixture comprises at least 3 weight percent and not more than 10 weight percent of said solid acid catalyst, based on the total weight of said styrene in said reaction mixture, wherein the moisture content of said solid acid catalyst is at least 1 weight percent and not more than 8 weight percent, based on the total weight of said solid acid catalyst.

8. The process of claim 1, further comprising, subsequent to said polymerizing of step (b), separating at least a portion of said polystyrene polymer from said reaction mixture to thereby provide a polystyrene product and a separated reaction mixture and recycling at least a portion of said separated reaction mixture for use in said combining of step (a).

9. The process of claim 1, further comprising, at least partially hydrogenating at least a portion of said polystyrene homopolymer resin subsequent to said polymerizing of step (b) to thereby provide an at least partially hydrogenated polystyrene polymer having an aromatic hydrogen content of not more than about 15 percent, as measured by proton NMR.

10. The process of claim 9, further comprising, utilizing at least a portion of said at least partially hydrogenated polystyrene polymer in an adhesive composition selected from the group consisting of hot melt pressure sensitive adhesives, hot melt nonwoven adhesives, and hot melt packaging adhesives.

11. The process of claim 1 , wherein said solvent is an inert solvent having a proton NMR aromaticity of not more than 10 percent , wherein said inert solvent comprises tetramethylcyclohexane, trimethylcyclohexane, hexane, cyclohexane, heptanes, mineral spirits, or combinations thereof.

12. The process of claim 11, wherein the weight ratio of said inert solvent to said one or more monomers in said reaction mixture is at least 30:70.

13. The process of claim 1, wherein said polymerizing of step (b) is carried out at an average reaction temperature of at least 40°C and not more than 105°C and said reaction temperature changes by not more than 5°C during said polymerizing of step (b).

14. The process of claim 1, further comprising, at least partially hydrogenating at least a portion of said polystyrene hompolymer resin subsequent to said polymerizing of step (b) to thereby provide an at least partially hydrogenated polystyrene polymer having an aromatic hydrogen content of at least about 2 percent, as measured by proton NMR