CLAIMS

We claim:

1. A method for making a plasticized polymer comprising the step of:

polymerizing a polymerizable monomer in a reaction medium comprising a plasticizer and in the presence of a catalyst system for a time and temperature sufficient to form a plasticizer system comprising the plasticized polymer, wherein the plasticizer system further comprises at least 25 wt% of the plasticizer and is suitable for use as a component in an adhesive, wherein:

the plasticizer is selected from the group consisting of mineral oil, liquid polybutene, hydrocarbon oil, synthetic oil, a dibenzoate, a phosphate, a phthalate ester, and an ester of a monoglycol or a polyglycol, and preferably comprises mineral oil, and

the reaction medium contains less than 10 wt% solvent.

2. The method of claim 1, wherein the polymerizing step is a batch process.
3. The method of claim 1, wherein the polymerizing step is a continuous process.
4. The method of claim 1, wherein the molecular weight of the polymer is between ~~about~~ 5,000 to ~~about~~ 200,000 g/mol, preferably between ~~about~~ 7,500 g/mol to ~~about~~ 150,000 g/mol, more preferably between ~~about~~ 10,000 g/mol to ~~about~~ 100,000 g/mol, and most preferably between ~~about~~ 10,000 g/mol to ~~about~~ 80,000 g/mol.
5. The method of claim 1, wherein the amount of monomer added is sufficient to provide an amount of polymer in the plasticized polymer of from ~~about~~ 2 wt% to an amount just below the solubilization limit of the plasticized polymer at 230°C.
6. The method of claim 1, wherein the monomer comprises an unsaturated monomer.
7. The method of claim 6, wherein the unsaturated monomer comprises an alkene.
8. A method for making an adhesive comprising the steps of:

polymerizing a polymerizable monomer in a reaction medium comprising a plasticizer and in the presence of a catalyst system for a time and temperature sufficient to form a plasticizer system comprising ~~a~~the plasticized polymer, wherein

the plasticizer system comprises at least 25 wt% of the plasticizer and is suitable for use as a component in an adhesive; and

mixing a tackifying resin with the plasticized polymer to produce the adhesive, wherein:

the plasticizer is selected from the group consisting of mineral oil, liquid polybutene, hydrocarbon oil, synthetic oil, a dibenzoate, a phosphate, a phthalate ester, and an ester of a monoglycol or a polyglycol, and preferably comprises mineral oil, and

the reaction medium contains less than 10 wt% solvent.

9. The method of claim 8 further comprising mixing additives with the plasticized polymer.

10. The method of claim 8 further comprising mixing a polymer in solid~~sold~~ form polymer with the plasticized polymer.

11. The method of claim 8 further comprising a second polymerizing step different from the polymerizing step to provide a second plasticized polymer and the mixing step comprises mixing the second plasticized polymer with the first plasticized polymer to form a bi-modal polymer blend.

12. The method of claim 8 further comprising mixing additional plasticizer with the plasticized polymer, wherein the additional plasticizer is the same as or different from the plasticizer of the plasticized polymer.

13. The method of claim 8 further comprising transporting the plasticized polymer between the polymerizing and mixing steps.

14. The method of claim 8, wherein the polymerizing and mixing steps are carried out without any intervening solvent removal step.

15. The method of claim 8, wherein the polymerizing and mixing steps are carried out without any intervening pelletizing or extruding steps.

16. A composition comprising:

(a) a polymer system comprising a first polymer;

(b) a ~~plasticized~~ plasticizer system comprising a first plasticizer that was used in a~~the~~ polymerization step to make the first polymer, wherein the plasticizer system comprises at least 25 wt% of the first plasticizer, preferably at least 50 wt% of the first plasticizer,

more preferably at least 75 wt% of the first plasticizer, and most preferably at least 90 wt% of the first plasticizer, and the first plasticizer is selected from the group consisting of mineral oil, liquid polybutene, hydrocarbon oil, synthetic oil, a dibenzoate, a phosphate, a phthalate ester, and an ester of a monoglycol or a polyglycol, and preferably comprises mineral oil; and

(c) a tackifier.

17. The composition of claim 16 further comprising at least one of a stabilizer and an antioxidant.

18. The composition of claim 16, wherein the first polymer has a density below 0.94 g/ml, preferably below 0.92 g/ml, more preferably below 0.91 g/ml, and most preferable 0.90 g/ml.

19. The composition of claim 18, wherein the number average molecular weight of the first polymer is less than 200,000 g/mol, preferably less than 150,000 g/mol, more preferably less than 100,000 g/mol, and most preferably less than 80,000 g/mol.

20. The composition of claim 16, wherein the polymer system further comprises a second polymer.

21. The composition of claim 17, comprising:

(a) between ~~about~~ 10 to ~~about~~ 40 wt% of the polymer system, preferably between ~~about~~ 15 to ~~about~~ 35 wt% and more preferably between ~~about~~ 20 to ~~about~~ 30 wt%;

(b) between ~~about~~ 10 to ~~about~~ 40 wt% of the plasticizer system, preferably between ~~about~~t 15 to ~~about~~ 35 wt% and more preferably between ~~about~~ 20 to ~~about~~ 30 wt%; and

(c) between ~~about~~ 30 to ~~about~~ 70 wt% a tackifier, preferably between ~~about~~ 35 to ~~about~~ 65 wt% and more preferably between ~~about~~ 40 to ~~about~~ 60 wt%.

~~22. The composition of claim 16, wherein the plasticizer system comprises at least about 25 wt% of the first plasticizer, preferably at least about 50 wt% of the first plasticizer, more preferably at least about 75 wt% of the first plasticizer, and most preferably at least about 90 wt% of the first plasticizer.~~

22~~23.~~The composition of claim 16, wherein the composition is one of an adhesive, a sealant, a coating, or a lubricant.