CLAIMS

The invention claimed is:

1. A cationic polymerization method comprising:

reacting, under reaction conditions:

5-Ethylidene-2-norbornene (ENB) monomers;

a catalyst trimethylsilylchloride;

a co-catalyst of lithium tetrakis(pentafluorophenyl) borate ethyl etherate; and

an optional polar solvent,

thereby producing a 5-Ethylidene-2-norbornene polymer (polyENB).

2. The cationic polymerization method of claim 1, wherein the reaction conditions comprise a reaction temperature in the range of about 20°C to about -45°C.

3. The cationic polymerization method of claim 1, wherein the reaction conditions comprise a reaction time in the range of about 10 minutes to about 90 minutes.

4. The cationic polymerization method of claim 1, further comprising initially reacting the ENB monomers and the trimethylsilylchloride catalyst under the reaction conditions for about 1 minute.

5. The cationic polymerization method of claim 1, wherein the polar solvent is present and selected from the group consisting of methyl chloride, hexane, and any combination thereof.

6. The cationic polymerization method of claim 1, wherein the polar solvent is present and is methyl chloride.

7. The cationic polymerization method of claim 1, wherein the polyENB has a weight average molecular weight in the range of about 50 kilodaltons to about 700 kilodaltons.

8. The cationic polymerization method of claim 1, wherein the polyENB has a glass transition temperature in the range of about 100°C to about 250°C.

9. The cationic polymerization method of claim 1, wherein the polyENB has a tensile strength in the range of about 15 megapascals to about 30 megapascals.

10. The cationic polymerization method of claim 1, wherein the polyENB has a Young's Modulus in the range of about 2,000 megapascals to about 3,000 megapascals.

11. The cationic polymerization method of claim 1, wherein the polyENB has a strain at break in the range of about 1% to about 5%.

12. A composition comprising:

a catalytic polymerization reaction product of:

5-Ethylidene-2-norbornene (ENB) monomers;

a catalyst trimethylsilylchloride;

a co-catalyst of lithium tetrakis(pentafluorophenyl) borate ethyl etherate; and

an optional polar solvent,

thereby producing a 5-Ethylidene-2-norbornene polymer (polyENB).

13. The composition of claim 12, wherein the ENB monomers and the trimethylsilylchloride catalyst are present in a ratio of about 400:1 to about 5000:1.

14. The composition of claim 12, wherein the polyENB has an olefinic proton content of less than about 5 mol%.