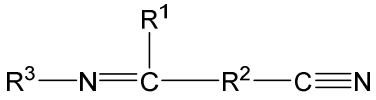
CLAIMS

What is claimed is:

1. A method for preparing a functionalized polymer, the method comprising the steps of:

(i) polymerizing monomer to form a reactive polymer, and

(ii) reacting the reactive polymer with an imine compound containing a cyano group where the imine compound containing a cyano group is defined by the formula I:



where R^1 is a hydrocarbyl group devoid of heteroatoms, R^2 is a bond or a divalent organic group, and R^3 is a hydrocarbyl group devoid of heteroatoms.

2. The method of claim 1, where the monomer includes conjugated diene monomer.

3. The method of claim 2, where said step of polymerizing employs a coordination catalyst.

4. The method of claim 3, where the coordination catalyst is a lanthanide-based catalyst.

5. The method of claim 4, where the lanthanide-based catalyst includes (a) a lanthanide-containing compound, (b) an alkylating agent, and (c) a halogen source.

6. The method of claim 5, where the alkylating agent includes an aluminoxane and an organoaluminum compound represented by the formula AlR_nX_{3-n}, where each R, which may be the same or different, is a monovalent organic group that is attached to the aluminum atom via a carbon atom, where each X, which may be the same or different, is a hydrogen atom, a halogen atom, a carboxylate group, an alkoxide group, or an aryloxide group, and where n is an integer of 1 to 3.

7. The method of claim 4, where said step of polymerizing monomer takes place within a polymerization mixture including less than 20% by weight of organic solvent.

8. The method of claim 1, where the imine compound containing a cyano group is an N-(cyanohydrocarbylidene)hydrocarbylamine selected from the group consisting of N-[α-(cyanoaryl)hydrocarbylidene]arylamine, N-(cyanoalkylidene)alkylamine, N-[α-(cyanoaryl)hydrocarbylidene]alkylamine, and N-(cyanoalkylidene)arylamine.

9. The method of claim 8, where the N-[α-(cyanoaryl)hydrocarbylidene]arylamine is selected from the group consisting of cis and trans isomers of N-(2-cyanobutylidene)-n-butylamine, N-(3-cyanobutylidene)-n-butylamine, N-(4-cyanobutylidene)-n-butylamine, N-(2-cyanobutylidene)-n-pentylamine, N-(3-cyanobutylidene)-n-pentylamine, N-(4-cyanobutylidene)-n-pentylamine, N-(2-cyanobutylidene)-n-hexylamine, N-(3-cyanobutylidene)-n-hexylamine, N-(4-cyanobutylidene)-n-hexylamine, N-(2-cyanobutylidene)cyclohexylamine, N-(3-cyanobutylidene)cyclohexylamine, and N-(4-cyanobutylidene)cyclohexylamine.

10. The method of claim 8, where the N-(cyanoalkylidene)alkylamine is selected from the group consisting of cis and trans isomers of N-(2-cyanobenzylidene)-n-butylamine, N-(3-cyanobenzylidene)-n-butylamine, N-(4-cyanobenzylidene)-n-butylamine, N-(2-cyanobenzylidene)-n-pentylamine, N-(3-cyanobenzylidene)-n-pentylamine, N-(4-cyanobenzylidene)-n-pentylamine, N-(2-cyanobenzylidene)-n-hexylamine, N-(3-cyanobenzylidene)-n-hexylamine, N-(4-cyanobenzylidene)-n-hexylamine, N-(2-cyanobenzylidene)cyclohexylamine, N-(3-cyanobenzylidene)cyclohexylamine, and N-(4-cyanobenzylidene)cyclohexylamine.

11. The method of claim 8, where the N-[α-(cyanoaryl)hydrocarbylidene]alkylamine is selected from the group consisting of cis and trans isomers of N-(2-cyanobutylidene)aniline, N-(3-cyanobutylidene)aniline, N-(4-cyanobutylidene)aniline, N-(2-cyanobutylidene)-2-methylaniline, N-(3-cyanobutylidene)-2-methylaniline, N-(4-cyanobutylidene)-2-methylaniline, N-(2-

cyanobutylidene)-3-methylaniline, N-(3-cyanobutylidene)-3-methylaniline, N-(4-cyanobutylidene)-3-methylaniline, N-(2-cyanobutylidene)-4-methylaniline, N-(3-cyanobutylidene)-4-methylaniline, and N-(4-cyanobutylidene)-4-methylaniline.

12. The method of claim 8, where the N-(cyanoalkylidene)arylamine is selected from the group consisting of cis and trans isomers of N-benzylidene-2-cyanoaniline, N-benzylidene-3-cyanoaniline, N-benzylidene-4-cyanoaniline, N-(2-methylbenzylidene)-2-cyanoaniline, N-(2-methylbenzylidene)-3-cyanoaniline, N-(2-methylbenzylidene)-4-cyanoaniline, N-(3-methylbenzylidene)-2-cyanoaniline, N-(3-methylbenzylidene)-3-cyanoaniline, N-(3-methylbenzylidene)-4-cyanoaniline, N-(4-methylbenzylidene)-2-cyanoaniline, N-(4-methylbenzylidene)-3-cyanoaniline, and N-(4-methylbenzylidene)-4-cyanoaniline.