CLAIMS

1. A method of post-polymerization modification of an isobutylene-based polymer, comprising the steps of:

(a) reacting a polymer with at least one nucleophile in a nucleophilic substitution reaction; and

(b) recovering a functionalized polymer;

wherein the reaction is substantially free of a solvent and wherein the reaction time of the nucleophilic substitution is 10 minutes to 15 minutes.

2. The method of claim 1, wherein the nucleophile is selected from the group consisting of thioacetate, phenoxide, alkoxide, carboxylate, thiolate, thiocarboxylate, dithiocarboxylate, thiourea, thiocarbamate, dithiocarbamate, xanthate, thiocyanate, and combinations thereof.

3. The method of claim 1, wherein the nucleophilic substitution reaction is performed in the presence of a phase transfer catalyst.

4. The method of claim 3, wherein the phase transfer catalyst is tetrabutyl ammonium bromide.

5. The method of claim 3, wherein the phase transfer catalyst is selected from the group consisting of ammonium salts, heterocyclic ammonium salts, phosphonium salts, DL-α-Tocopherol methoxypolyethylene glycol succinate, DL-α-Tocopherol methoxypolyethylene glycol succinate solution, and combinations thereof.

6. The method of claim 1, wherein the functionalized polymer is a thioacetate functionalized poly(isobutylene-co-para-methylstyrene).

7. The method of claim 1, wherein the functionalized polymer is a mercaptobenzothiazole functionalized poly(isobutylene-co-para-methylstyrene).

8. The method of claim 1, wherein the functionalized polymer is a thioacetate functionalized poly(isobutylene-co-isoprene).

9. The method of claim 1, wherein the functionalized polymer is a mercaptobenzothiazole functionalized poly(isobutylene-co-isoprene).

10. A method of post-polymerization modification of an isobutylene-based polymer, comprising the steps of:

(a) reacting a polymer with a first nucleophile to form a first functionalized polymer;

(b) reacting the first functionalized polymer with a second nucleophile; and

(c) recovering the bi-functionalized polymer;

wherein the reaction is substantially free of a solvent and wherein the first nucleophile is an amine.