CLAIMS

1. A solid, ionically conductive, polymer material having:

a crystallinity greater than 30%;

an ionic conductivity greater than 1×10^{-4} S/cm at room temperature;

and both at least one cationic and anionic diffusing ion, wherein at least one diffusing ion is mobile at room temperature.

2. The material of claim 1, wherein material has a melting temperature, and the melting temperature of the material is greater than 250^{o}C.

3. The material of claim 1, wherein the material is in a glassy state at room temperature.

4. The material of claim 1, wherein the material further comprises at least one charge transfer complex, wherein the charge transfer complex is formed by the reaction of a polymer and an electron acceptor.

5. The material of claim 1, wherein the material is a thermoplastic.

6. The material of claim 1, wherein the cationic diffusing ion comprises lithium.

7. The material of claim 1, wherein the cationic transference number of the material is greater than 0.5 and less than 1.0.

8. The material of claim 6, wherein the concentration of lithium is greater than one mole of lithium per liter of material.

9. The material of claim 1, wherein the material is comprised of monomers, and each monomer comprises an aromatic or heterocyclic ring structure positioned in the backbone of the polymer.

10. The material of claim 9, wherein the material further includes a heteroatom incorporated in the ring structure or positioned on the backbone of the polymer adjacent the ring structure.

11. The material of claim 1, wherein the ionic conductivity of the material is isotropic.

12. The material of claim 1, having an ionic conductivity greater than 1×10^{-3} S/cm at room temperature.

13. The material of claim 1, having an ionic conductivity greater than 1×10^{-5} S/cm at -40^{o}C.

14. The material of claim 1, wherein the material exhibits UL 94 V-0 flame retardancy.

15. The material of claim 1, wherein the material is non-reactive when mixed with a second material wherein the second material is selected from a group consisting of a electrochemically active material, an electrically conductive material, a rheological modifying material, and a stabilizing material.

16. The material of claim 1, wherein the material is in the shape of a film.

17. The material of claim 1, wherein the Young's modulus of the material is equal to or greater than 3.0 MPa.

18. A solid, ionically conductive, polymer material having:

an ionic conductivity greater than 1×10^{-4} S/cm at room temperature;

and both at least one cationic and anionic diffusing ion, wherein at least one diffusing ion is mobile at room temperature,

wherein the cationic transference number of the material is greater than 0.5 and less than 1.0.

19. The material of claim 18, wherein the material has a crystallinity greater than 30%.

20. The material of claim 18, wherein material has a melting temperature, and the melting temperature of the material is greater than 250^{o}C.

21. The material of claim 18, wherein the material is in a glassy state at room temperature.

22. The material of claim 1, wherein the material is a thermoplastic.

23. The material of claim 1, wherein the cationic diffusing ion comprises lithium.