CLAIMS

What is claimed is:

1. ~~A~~ An elastomeric nanocomposite comprising:

   (a) at least one elastomeric polymer comprising units derived from isoolefins having from 4 to 7 carbon atoms;

   (b) at least 10 phr of a graphitized carbon black; and

   (c) ~~at least 1 phr~~ from 0.5 to 10 wt% of a smectite or smectite-type nanoclay,

   wherein when the nanocomposite is used in an article, the article has a gas permeation coefficient of 80.0 cc*mm/[m^2-day] or less at 40°C.

2. The nanocomposite of claim 1, wherein a carbon black was heated to a temperature of 200°C or greater, for a time of at least 8 hours, optionally under a substantially inert atmosphere, to provide the graphitized carbon black.

3. The nanocomposite of claim 1 or 2, wherein the polymer comprises units derived from at least one C_4 to C_7 isoolefins and at least one multiolefin.

4. The nanocomposite of any one of claims 1 to 3, wherein the nanocomposite is further blended with a thermoplastic polymer selected from the group consisting of polyamides, polyimides, polycarbonates, polyesters, polysulfones, polylactones, polyacetals, acrylonitrile-butadiene-styrene polymers, polyphenyleneoxide, polyphenylene sulfide, polystyrene, styrene-acrylonitrile polymers, styrene maleic anhydride polymers, aromatic polyketones, poly(phenylene ether), and mixtures thereof to form a polymer blend.

5. The nanocomposite of claim 4, wherein the nanocomposite and the thermoplastic polymer are dynamically vulcanized together.

6. The nanocomposite of any one of claims 1 to 5, wherein the nanoclay is selected from montmorillonite, nontronite, beidellite, bentonite, volkonskoite, laponite, hectorite, saponite, sauconite, magadite, kenyaite, stevensite, vermiculite, halloysite, aluminate oxides, hydrotalcite, and mixtures thereof.

7. An article comprising the nanocomposite of any one of claims 1 to 6.

8. The article of claim 7, wherein the article is an innerliner or a film.

9. A method for reducing the permeability of an article comprising an elastomeric nanocomposite comprising:

(a) obtaining ~~a~~ an elastomeric polymer comprising units derived from isoolefins having from 4 to 7 carbon atoms;

(b) blending ~~at least 1 phr of~~ from 0.5 to 10 wt% of a smectite or smectite-type nanoclay with the polymer to obtain an elastomeric nanocomposite; and

(c) adding at least 10 phr of a graphitized carbon black to the elastomeric nanocomposite.

10. The method of claim 9, wherein a carbon black was heated to a temperature of 200°C or greater, for a time of at least 8 hours, optionally under nitrogen, to obtain the graphitized carbon black.

11. The method of claim 9 or 10, wherein the blending is one of melt blending, solution blending, or emulsion blending.

12. The method of any one of claims 9 to 11, wherein the polymer is a polymer comprising units derived from at least one C_4 to C_7 isoolefin and at least one multiolefin.

13. The method of any one of claims 9 to 12, further comprising admixing at least one thermoplastic polymer selected from the group consisting of polyamides, polyimides, polycarbonates, polyesters, polysulfones, polylactones, polyacetals, acrylonitrile-butadiene-styrene polymers, polyphenyleneoxide, polyphenylene sulfide, polystyrene, styrene-acrylonitrile polymers, styrene maleic anhydride polymers, aromatic polyketones, poly(phenylene ether), and mixtures thereof.

14. The method of any one of claims 9 to 13, wherein the nanoclay is at least one of

montmorillonite, nontronite, beidellite, bentonite, volkonskoite, laponite, hectorite, saponite, sauconite, magadite, kenyaite, stevensite, vermiculite, halloysite, aluminate oxides, and hydrotalcite.

~~15. An article comprising the nanocomposite prepared by the method of any one of claims 9 to 14.~~

~~16. The article of claim 15, wherein the article has a gas permeation coefficient of 80.0 cc*mm/[m^2-day] or less at 40°C.~~

~~17. A method of reducing the permeability of an article comprising an elastomer nanocomposite comprising:~~

~~(a) obtaining a polymer comprising units derived from isoolefins having from 4 to 7 carbon atoms;~~

~~(b) adding at least 1 phr of a nanoclay to the polymer to form an elastomeric nanocomposite;~~

~~(c) thereafter, calendaring and/or extruding the elastomeric nanocomposite; and~~

~~(d) thereby obtaining an oriented nanoclay elastomer nanocomposite having an orientation parameter, P_2, in the edge-on direction, of greater than 0.15.~~

~~18. The method of claim 17, further comprising adding at least 10 phr of a graphitized carbon black to the elastomeric nanocomposite.~~

~~19. The oriented nanoclay elastomer nanocomposite of claim 17 or 18.~~

~~20. An article comprising the oriented nanoclay elastomer nanocomposite of claim 17.~~