CLAIMS

What is claimed is:

1. A nanocomposite comprising at least one copolymer and at least one nanofiller:

the copolymer comprising units derived from isoolefins having from 4 to 7 carbon atoms and multiolefins; and

the nanofiller comprising a surfactant wherein the surfactant has the structure of $(R^1R^2R^3R^4)N^+$ wherein R^1 is benzyl derived unit, which may or may not be substituted, wherein R^2 is selected from C_1 to C_{26} alkyls, C_2 to C_{26} alkenes, and C_3 to C_{26} aryls, and wherein R^3 and R^4 are the same or different and are independently selected from C_9 to C_{26} alkyls, C_9 to C_{26} alkenes, and C_9 to C_{26} aryls.

2. The nanocomposite of claim 1, wherein the copolymer is halogenated with either chlorine or bromine.

3. The nanocomposite of claim 1 or 2, wherein the copolymer has a substantially homogeneous compositional distribution and comprises from ~~about~~ 8 to ~~about~~ 12 wt% of alkylstyrene moieties and from ~~about~~ 1.1 to ~~about~~ 1.5 wt% of a halogen and wherein said copolymer has a ratio of Mw/Mn of less than ~~about~~ 6.

4. The nanocomposite of claim 3, wherein the alkylstyrene is para-methylstyrene and the isoolefin comprises isobutylene.

5. The nanocomposite of claim 3 or 4, wherein the alkylstyrene is functionalized with the halogen, and up to 25 mol% of the alkylstyrene is so functionalized.

6. The nanocomposite of any one of claims 3 to 5, wherein from 10 to 25 mol% of the alkylstyrene is functionalized by a halogen.

7. The nanocomposite of any one of claims 1 to 6, wherein the nanocomposite is blended with a secondary polymer to form a compound, the compound containing from 5 to 90 phr of the nanocomposite.

8. The nanocomposite of claim 7, wherein the secondary polymer is selected from the group consisting of natural rubbers, polybutadiene rubber, polyisoprene rubber, poly(styrene-*co*-butadiene) rubber, poly(isoprene-*co*-butadiene) rubber, styrene-isoprene-butadiene rubber, ethylene-propylene rubber, ethylene-propylene-diene rubber, and mixtures thereof.